



Spring 2009

# Bulletin of the Massachusetts Archaeological Society, Vol. 70, No. 1

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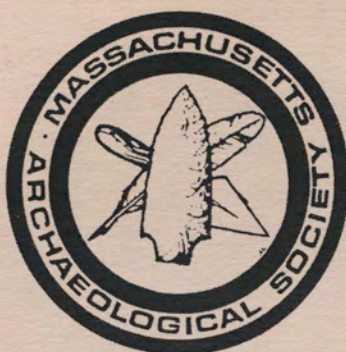
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# BULLETIN OF THE MASSACHUSETTS ARCHAEOLOGICAL SOCIETY



VOLUME 70 (1) SPRING 2009

## CONTENTS:

Editor's Note.	1
In Memoriam: Thomas E. Lux <i>Kathryn Fairbanks</i>	2
Fire Making Kits <i>William B. Taylor</i>	3
From Plow to Trowel, Concord's Dugans Brook Knoll Site Revealed. <i>Martin G. Dudek</i>	7
Mount Tom Cherts and Associated Lithics, Connecticut Valley, Massachusetts <i>David Driver and Barbara Calogero</i>	29
A Stranger in My Field <i>Donald Gammons.</i>	49
Contributors	51

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## Editor's Note

It is with considerable pleasure and a real sense of responsibility that I take on the task of editing the *MAS Bulletin*. I am firmly committed to the founding principle of the MAS: that it provide a means for both amateur and professional archaeologists to come to a better understanding of the Native past in our region. To this end, as editor, I will generally seek out a mix of articles by members of both ends of this continuum, and all points between. For some issues, I may try to assemble a group of articles around a particular theme, but at other times I welcome submissions from all interested and serious researchers, regardless of their academic credentials. While I will make every effort to retain the high standard of reporting traditional to our *Bulletin*, I will also engage as proofreaders members of the amateur community to ensure that the texts are comprehensible to the interested non-professional. I want to extend my thanks to Kathy Fairbanks and Bill Moody for serving in this capacity for the current issue, and I hope that they will continue their good work in the future.

The current issue is a good example of this kind of mix. It includes two longer articles by professional archaeologists: Martin Dudek's report on the excavation of the Dugans Brook Knoll site in Concord, MA and Barbara Calogero and "Bud" Driver's report on a newly discovered lithic source in the mid-Connecticut Valley. There are also two shorter articles by non-professionals: Bill Taylor's article on strike-a-lights, informed by his own personal field experience many years ago at the Titicut site; and Don Gammons' report of a find in his field of a large cobble of workable coalstone. To illustrate the ties that bind the archaeological community, Don sent a sample of the coalstone cobble off to Barbara Calogero for thin-sectioning and analysis. Finally, Kathy Fairbanks has contributed a biographical piece in memory of one of our beloved Museum mainstays, Tom Lux, who passed away late last year.

I wish to make it clear that from time to time I am prepared to include articles which explore controversial subjects, so long as the authors argue their perspectives clearly and base them firmly upon the evidence. To dismiss claims simply because they are not fashionable under some theoretical framework strikes me as not being very scientific. As our charter states, the purpose of MAS is

"to stimulate the study of archaeology, particularly in Massachusetts; to promote and encourage scientific research in this field; to conserve archaeological sites, data, and artifacts; to assist in the dissemination of archaeological information; to seek through education to substitute intelligent work for careless and misdirected archaeological activity; to seek to prevent the collection of archaeological specimens for commercial purposes; to serve as a bond among all students of archaeology; and to foster a more rational public understanding of the aims and limits of archaeological research." (MAS Constitution)

Researchers should feel free to follow the evidence where it leads them. When this leads to the discovery of patterns hitherto unnoticed in the material culture of the past, then we all have the opportunity to grow in our knowledge. If this new knowledge has implications for site preservation, then it is all the more important to bring it into print.

Readers will notice that this issue is longer than usual. While this is in part due to the length of the submissions, it is also thanks to a discount in printing costs from our new printer.

Curtiss Hoffman

## In Memoriam: Thomas E. Lux

### Kathryn Fairbanks

Anyone who has been an MAS member for very long has known Tom Lux -- or has thought they did. In a succession of roles, as Trustee, Museum Director, and Office Manager, he was always reassuringly there at his desk, putting the *Newsletter* together, doing the mail, browsing the incoming archaeology journals, offering with a grin a wry comment on some point of the ongoing conversation. We might have mistaken him for a well-informed armchair archaeologist, a quiet scholar. But then we'd known him only since 1970.

In his younger years and slightly leaner condition, the U.S. Army sent him to Japan to their cook-and-baker school during the Korean War. The culture of the Far East became his strong interest. He went home after his hitch to Rochester, NY, to undergraduate work at St. John Fisher College. Following two years at the University of Chicago, a Fulbright Scholarship gave him the chance to teach English in Thailand. From his research there came his thesis, *Mango Village*, for a Master's Degree in Anthropology.

Tom worked at American University's Foreign Area Studies program in Washington D.C., writing and revising government handbooks on Thailand, on Cyprus, and one on Bhutan, Nepal and Sikkim. He then spent two years at Cornell University on a National Defense Foreign Language Fellowship, and returned to Thailand as a member of a sociological survey team for the University of Chicago. This time Tom and a team member walked three hundred km through the Thai countryside, gathering data, and staying nights in village homes along the

way. Later, the Stanford Research Institute sent him along the Mekong River border between Thailand and Laos.

Finally, Tom came home to teach a year at Ithaca College and two years at the University of Vermont, Burlington. He happened to be among the first to view the discovery of Adena-related material at a famous Annual Meeting of the Eastern States Archaeological Federation. Workers from a local construction job walked into the meeting with the Indian artifacts they had just uncovered, and ESAF members decamped to the Missisquoi River to visit the (present) Boucher site.

Tom Lux began teaching Anthropology at Providence College in 1970. There he met Carol Barnes and MAS. He volunteered at the Bear Swamp, Peace Haven, Read Farm, Wapanucket-8, Pratt Farm, and Tobey sites and helped out at the Bronson Museum (now the Robbins Museum). When he retired, Tom seldom missed a Wednesday workday at the Robbins. Those who visited him at his house in Riverside, RI say that it was more like a library that he lived in. (Jean-Jacques Rivard says that Tom's sending MAS twenty-nine boxes of books recently didn't make a dent in what he had.) In his backyard he laid down stone walkways to separate his flower gardens, Fred Robinson says, and wind chimes hung from the trees.

Tom Lux died in Providence, November 22, 2008, after an extended illness. He will be very much missed.

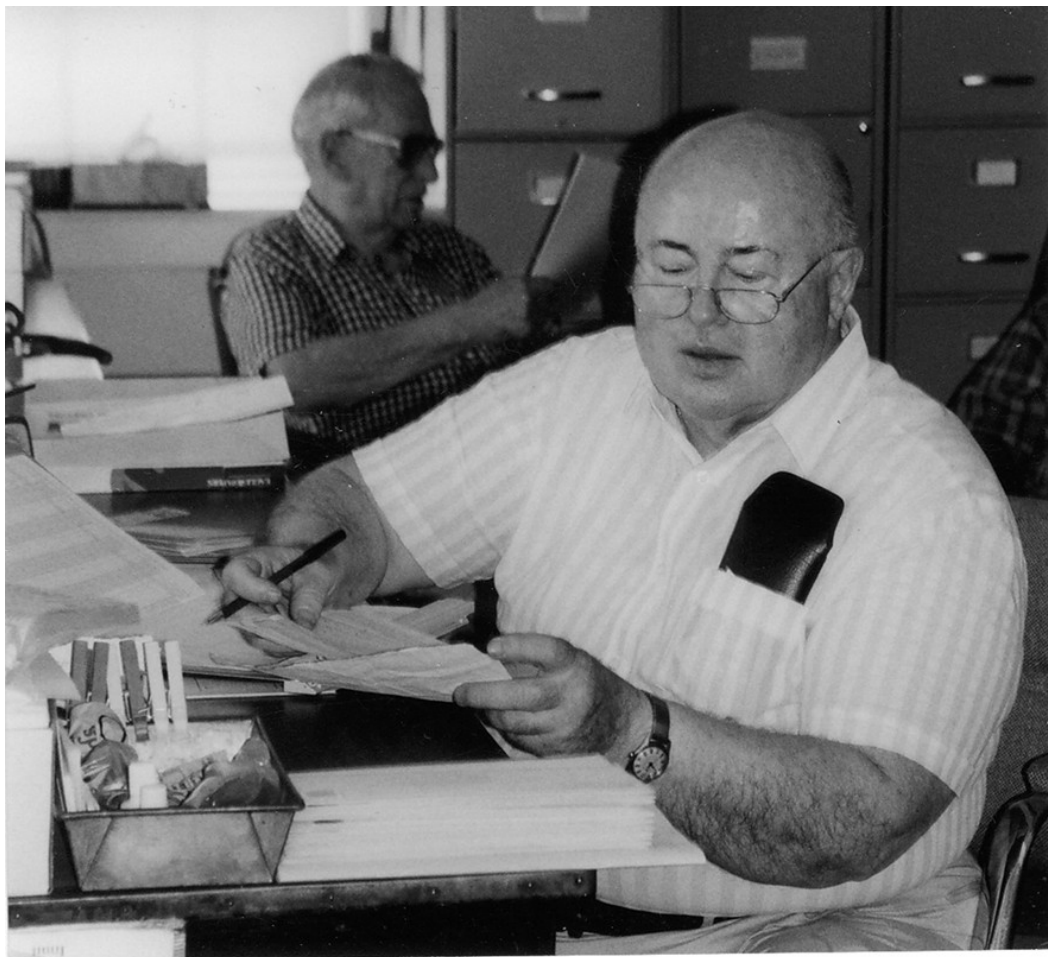


Figure 1. Tom Lux at his desk at the Robbins Museum

## Fire-Making Kits

William B. Taylor

### Abstract

Indians from at least Late Archaic through the Contact Period used fire-making kits to start their fires. "Although the fire drill was known it was not used except in an emergency, because it was hard to find suitable wood. Most all Indians on hunting trips carried a leather pouch with prepared tinder, a lump of pyrites and a flint striker, so as to always be able to start a fire in wet weather . . . Tinder included

touchwood or spunk, which grows on black birch. Also used were seeds of the cotton-grass, dried moss, dried cattails, etc. This material was kept in a skin bag to protect the tinder from dampness" (Willoughby 1935: 78-79).

### Local Recoveries

In 1970, fire-making kits were discovered in secondary burials #s 12 and 13 at the Seaver Farm,

Bridgewater, MA. Only felsite strikers remained; the pyrites blocks had long since disintegrated. Deposits #s 1, 3 and 6 in burial # 12 held felsite strikers, with a yellow-orange staining. Burial pit # 13 also had a striker and most all the points had a coating of disintegrated pyrites. In the main Dunn Crematory a few blades also held pyrites staining, as well as red ochre remains, all from the Transitional Archaic/Susquehanna Tradition.

It is only during the Late Woodland and Contact period that remains of a fire-making kit can be found. Burial # 15 at the Titicut Site was such a burial. Since Fred Johnson did not include his excavation notes from this burial, much important information was omitted from the Titicut Site Report (Robbins1967). During the last two years I have acquired some of the original Johnson notes from Ken Alves of the Assonet Band of the Wampanoag Nation. With his permission I have updated new information from these burials. It seems only appropriate that these facts be known to M.A.S. members.

### **Burials #s 14A-14B and 15**

During the summer of 1947, Fred Johnson and three members from the Robert S. Peabody Foundation in Andover, Massachusetts excavated at the Titicut Site in Bridgewater, Massachusetts. Dr. Johnson returned one weekend in October to see how members of the Moorehead Chapter of the M.A.S. were doing. His arrival was timed perfectly with the discovery of new burials, which I had uncovered. These three burials were then dug by Fred Johnson. The remains had been placed side by side in one large trench-like pit. On the west end was "burial 14A-a flexed burial lying on the right side. Rib cage was collapsed so that the left ribs had twisted over and across to the front of the skeleton. Parts of the right ribs were back of the spinal column. One arrow point was found near

the distal end of the left humerus" (Johnson 1947). In addition eight stone objects were included with this burial. Two quartz Squibnocket Triangles and one quartz scraper were whole; the other five pieces were broken projectile points.

Burial #14B lay in the middle and was a bundle burial. "All bones were disarticulated. Hand bones were distributed about. Atlas and axis were nowhere near the skull" (Johnson-1947). Two points are numbered from this burial but not noted in Johnson's report. One is a whole quartz Squibnocket Triangle and the other is a broken chert point. Although not included in Fred Johnson's notes, a colored photo of burial 14B shows red ochre on top of this skeleton.

"Burial number 15 on the east end of the pit was lined with bark. Bark was preserved on the south and west sides of the pit. On the north and east section of the bottom, this bark had disappeared, there was only a stain in the ground. Bark lining on the south edge seems to be made up of three layers. This combination was about one inch thick. On the bottom the lining is only one layer thick. Some red ochre was found on top of the skeleton column [sic!] and under the arm and skeletal column to the north. There was also a large amount of red ochre under the skull, particularly the occiput. The skeleton was loosely flexed with the skull turned to face its right. The spinal column and pelvis also faced its right -- the south. The legs were flexed to the right, the left portion of the shoulder girdle and arm had slumped to left of the spinal column. This skeleton was a middle-aged man approximately 35 to 40 years of age" (Johnson1947). A complete description of this adult was included in the Titicut Site report (Robbins 1967: 71, 73).

### **Observations and Burial Items**

This was a most interesting grave. Since I had

found burial # 15, Fred Johnson allowed me to stand in the open grave shaft while he excavated. Thus, I had a close hand view of his work. Some of my observations and recollections are as follows. Around the head were five oval flat cobbles. On one near the head (south side) were placed eight bone and antler projectile points and a shark's tooth (Mako?) in good condition (Figure 1). Alongside of the skeleton were the remains of a bow and quiver, although nothing but a decayed outline of each was remaining. Inside the quiver were the following objects:

1. A 2 ½" lump of pyrites with a stemless knife attached. This was the remains of a fire-making kit (Figure 2).
2. Seven additional projectile points of various types: three felsite Levannas, a Squibnocket Stemmed quartz point, a Squibnocket Triangle of quartz, and two broken points, that appear to be from an earlier period. Perhaps the Indians had found these around their campsite (Figure 3).
3. The 2 ½" stem of a clay pipe -- the bowl had disintegrated from direct contact with the pyrite lump (Figure 3).
4. A 1 ¾" piece of steatite used as a striker, and heavily coated with a yellow-orange encrustation of pyrites and showing mul-

tle scratches and scars from heavy usage (Robbins 1967:72, Figure 2). Estimated age of this burial is AD 1575±25 years based on the clay pipe. In his original interpretation of this burial, Fred Johnson concluded that these various objects were placed in a quiver at time of burial. He gave a talk at the 1947 fall meeting of the M.A.S. discussing these finds. He later changed his report and placed all items within the disintegrated adjacent bark lining. From what I observed, his first conclusions were correct.

### Conclusion

Early explorers along our coast describe fire-making kits as "a lump of pyrites and a piece of flint, when struck together cause sparks that would ignite prepared tinder and when gently blown produce fire" (Willoughby 1935:78). All fire-making kits that I have found used felsite strikers except burial # 15 at Titicut, which had a 1 ¾" piece of steatite. I believe these early explorers did not know what felsite was and concluded that flint was necessary to create a spark, the same way powder on a rifle or pistol was activated. Of course Indians that had a ready source of flint probably used it.

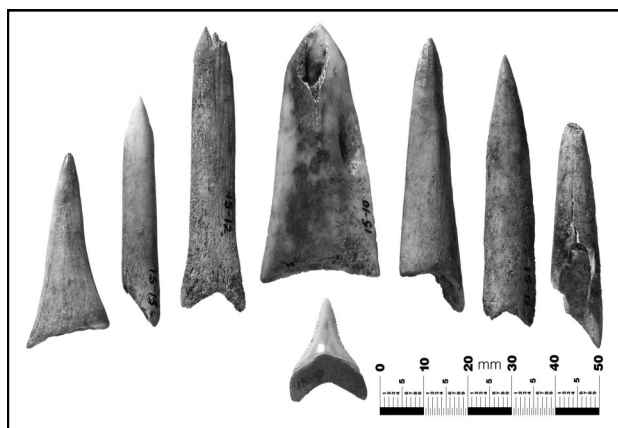
### References Cited

- Johnson, Frederick  
1947 Unpublished notes from his Titicut Site report.
- Robbins, Maurice.  
1967 The Titicut Site. *Bulletin of the Massachusetts Archaeological Society*. 28 (3&4): 33-76.
- Taylor, William B.  
1972 Seaver Farm Cremation Burials. . *Bulletin of the Massachusetts Archaeological Society*. 33 (3&4): 1-9.
- Taylor, William B.  
2006 A Review of Transitional Archaic Mortuary Features at the Seaver Farm. . *Bulletin of the Massachusetts Archaeological Society*. 67 (2): 48-58.
- Willoughby, Charles C.  
1935 Antiquities of the New England Indians. Cambridge, MA: Peabody Museum, The Cosmos Press.

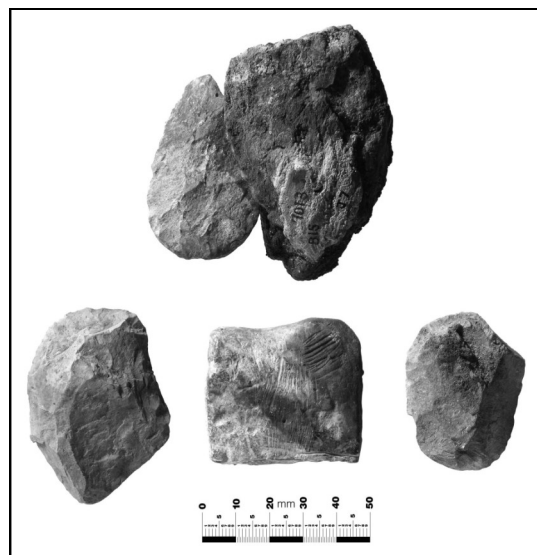


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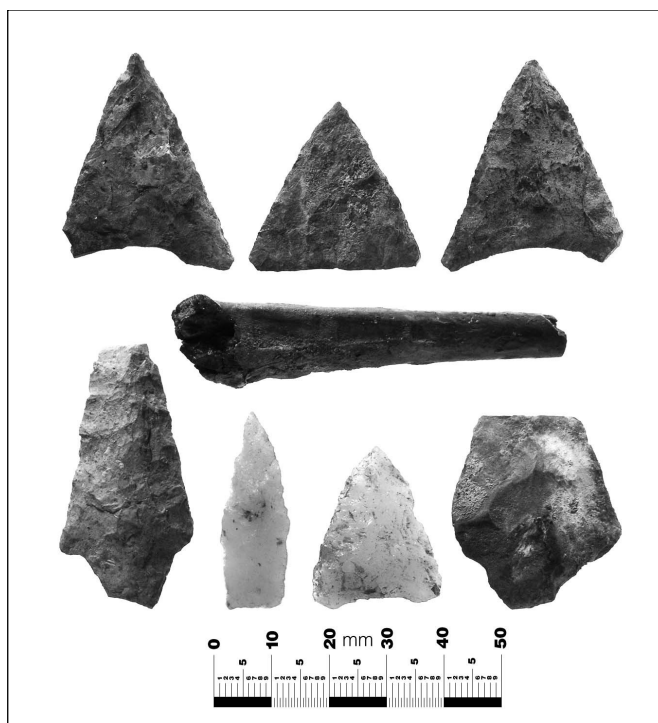
I would like to thank Jeff Boudreau for his assistance with photography, also Ken Alves for allowing me to use Fred Johnson's notes. I also want to thank Laurie Stundis for her help typing this report.



**Figure 1.** Eight bone and antler projectile points and a shark's tooth found in burial #15 at the Titicut Site in 1947.



**Figure 2.** At the top is a lump of pyrites, with a stemless knife attached; the remains of a fire-making kit. Below center is a steatite striker, both found in a quiver within burial #15. At the bottom right and left are two felsite strikers from burial #12 at the Seaver Farm. All strikers were covered with a yellow-orange coating of pyrites.



**Figure 3.** Seven projectile points and the stem of a clay pipe, also found in the quiver in burial #15 at the Titicut Site, Bridgewater, Massachusetts.

## From Plow to Trowel, Concord's Dugans Brook Knoll Site Revealed

Martin G. Dudek

### Abstract

The Town of Concord, Massachusetts has the largest quantity of recorded archaeological sites of any town in Massachusetts. This is due in part to the rich environmental setting where the Assabet and Sudbury Rivers join to form the Concord River. It is also due to the extensive work of Massachusetts Archaeological Society member and amateur archaeologist Benjamin Smith who identified and collected artifacts from over a hundred sites in Concord, Wayland and Sudbury, mostly from surface collecting in agricultural fields. Few of these sites have been investigated professionally. The Dugans Brook Knoll Site (19-MD-151) is one such site and gives us an example of the type of data these plowed sites may still be able to yield. Recent archaeological work at the site defined the site area and recovered several stone tools, over 500 pieces of chipping debris and 600 pieces of burned animal bone. Activity areas, features, and faunal remains left by Native Americans date from the Late Archaic and Early Woodland periods.

### Acknowledgements

JMA (John Milner Associates, Inc.) conducted the archaeological intensive survey and site examination for Tata & Howard, Inc. and the Town of Concord. Local archaeologist Shirley Blancke was instrumental in locating and displaying the artifacts and field notes by Ben Smith from the Dugans Brook Knoll Site stored at the Concord Museum. Faunal expert and past MAS president Tonya Largy analyzed the calcined bone from the site; her observations on the Dugans Brook Knoll Site assemblage are a valued part of the research, especially in light of

her experience with the nearby Clamshell Bluff Site faunal collection. The Concord Department of Public Works assisted the field excavation by building shelters and aiding in the backfilling. Special thanks is given to all the Town of Concord personnel who visited the site; their avid interest and positive demeanor was noteworthy. Field and laboratory personnel included Principal Archaeologist Martin Dudek, Alan Smith, Dawn Lassman and Thomas Mailhot.

**Dedication** For Martin J. Dudek, Jr. (1923-2009), my father

### Introduction

The Dugans Brook Knoll Site (19-MD-151) in Concord Massachusetts was first identified by Benjamin L. Smith, who collected artifacts from plowed fields across a broader site area in the 1940s. The Dugans Brook Knoll Site consists of what was described as a camp or fishing site located on a sandy knoll south of Dugans Brook (Massachusetts Historical Commission site form). Artifacts from the site collected by Ben Smith include seven Late Archaic points including Laurentian Tradition Brewerton points and Narrow Point Tradition Small Triangle and Small Stemmed points, and a Transitional Archaic to Early Woodland Orient Fishtail point. The variety of diagnostic points discovered by Ben Smith suggest a multi-component site used occasionally over the span of several thousand years (ca. 5000-2000 BP). If this is true, there might be several distinct or overlapping site loci from different events, possibly reflecting different temporal and/or seasonal uses or repetitive use for similar activities. Alternatively, the site could consist of a single locus related to the Laurentian Tradition tool kit (Broad-Eared/

Brewerton tool types, 5000-4000 BP) and several isolated finds of Small Stemmed, Small Triangle and Orient Fishtail points. In either case, the data reflect Late Archaic settlement and procurement strategies near a brook and the Sudbury River in what is one of the richest archaeological areas in Middlesex County.

The importance of the Sudbury-Assabet-Concord River (SuAsCo) area to Native Americans in pre-Contact times has been long attested to by artifact collections from the area, but scarcely studied through professional archaeological excavation. There are several exceptions for the area, most notably the archaeological investigations at the Sleepy Hollow Site (Blancke 1987, 1988, 1998, 1999, 2003; Waller and Ritchie 1997), which included a Late Archaic fire pit and two other activity area features; and the Pine Hawk Site along the Assabet River in Acton, which had a variety of Middle and Late Archaic features, including post molds, small hearths, deep pits and concentrations of burnt rock (Waller and Ritchie 2001). The Dugans Brook Knoll Site might be similar to Concord Site 19-MD-118, a small site (10 x 22 m) which contained two Brewerton points and fifty other artifacts consisting primarily of rhyolite chipping debris, with three other lithic materials present (Binzen and Donta 2001). This latter site may have been larger prior to the construction of Route 2 nearby.

The Dugans Brook Knoll Site (19-MD-151) appears to represent a relatively intact Late Archaic site located a short distance upriver from the fresh water clamshell middens of the Clamshell Bluff Site (19-MD-388, 19-MD-116), now largely obliterated (Davin 1985). If the Dugans Brook Knoll Site was related to fishing activities or clamshell exploitation, it might be able to yield important contextual data on these activities relevant to the Clamshell Bluff Site. The Dugans Brook Knoll Site might also yield good

comparative data for comparison with Site 19-MD-118 and Late Archaic components investigated through data recovery field work at the Sleepy Hollow and Pine Hawk Sites. The Dugans Brook Knoll Site was re-identified during an archaeological intensive survey for a water treatment facility (Figure 1). A site examination was subsequently conducted and defined the site area and investigated artifact concentrations and features.

### **Archaeological Sites in the Concord Vicinity**

A review of the site files at the Massachusetts Historical Commission (MHC) and the report on the Ben Smith collection (Johnson and Mahlstedt 1982) indicates that 65 pre-Contact Native American archaeological sites have been reported within a 3 km radius of the project area. Of these pre-Contact, 34 sites have temporal attributions based on diagnostic artifacts. A Paleoindian Clovis point was recovered from one site, and another site may have a Late Paleoindian component. One site has an Early Archaic component. Numerous sites are identified with Middle and/or Late Archaic artifacts. Early and Middle Woodland period sites are less numerous; however several are present, with Late Woodland period sites being well represented. Collector bias with respect to pottery, fewer diagnostic points and possibly the continuation of Small Stemmed points into the Early Woodland (Filios 1988) may be responsible for an apparent drop in the number of Early and Middle Woodland sites.

The sites recorded for the greater Concord area cluster around the Sudbury, Assabet, and Concord (SuAsCo) Rivers, brooks, ponds and wetlands. Most pre-Contact sites have been identified through the study of artifact collections, in particular the Ben Smith Archaeological Collec-

tion (Johnson and Mahlstedt 1982), or through archaeological surveys. Benjamin L. Smith (1900-1981) recorded 145 sites and collected artifacts from 107 of the sites (Johnson and Mahlstedt 1982:8); most sites were located in the Towns of Concord, Wayland and Sudbury. At the time of Hoffman and Edward's SuAsCo watershed archaeological inventory, 125 pre-Contact archaeological sites had been reported in the Town of

Concord, which comprised primarily of studies on artifact collections or inventory data, reconnaissance-level studies and/or settlement pattern studies. The thirty-two archaeological investigations include eleven studies that report on historic sites or features, seven studies with pre-Contact sites, eight studies with pre-Contact and historic sites or features, and six studies with an absence of sites. Two cultural resource studies were located close

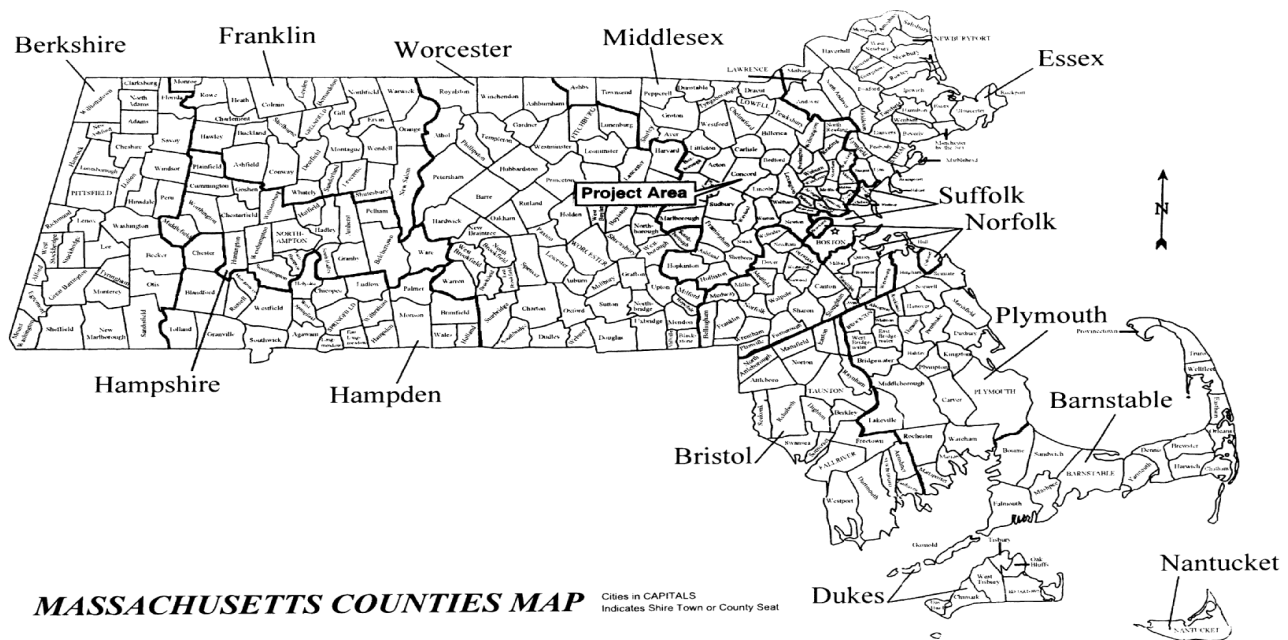


Figure 1. Project Area location, Concord, MA (<http://www.doe.mass.edu/resources/countymap.pdf>).

Concord within the SuAsCo watershed. Concord has the highest density of pre-Contact Native American sites of any town in the SuAsCo study area (Hoffman and Edwards 2002:140).

In addition to recorded sites, few Massachusetts towns have had as many cultural resource management (CRM) studies conducted and reported on as has the Town of Concord. A total of forty-three CRM reports are on file at the MHC for the Town of Concord; of these, thirty-two reports document the results of archaeological investigations, while the remainder of the reports are

to the Project Area. An intensive archaeological survey was conducted at the Emerson Hospital where two pre-Contact sites were located, both identified as the Clamshell Bluff Site (19-MD-116 and 388), a fresh water shell heap. The survey found that neither site retained integrity nor significance as a result of disturbance and no further archaeological investigation was recommended (Davin 1985). An estimated 500 pieces of bone, including turtle and porcupine, had been recovered from the Clamshell Bluff Site by Ben Smith (Smith 1940:22, 25). Another intensive archaeological survey was conducted for the

Robinson Well Project Area along Sudbury Road for a proposed well, controls station and 1800 ft of water main. Most of the area had a high to moderate sensitivity for archaeological sites; however intensive survey test pits did not identify any pre-Contact or historic period sites (Begley and Ritchie 1998).

### **Benjamin L. Smith's Notes and Collection from the Dugans Brook Knoll Site**

The Benjamin L. Smith artifact collection and notes from the Dugans Brook Knoll Site (19-MD-151) were examined at the Concord Museum. Shirley Blancke, a local archaeologist who has managed museum collections for many years was able to locate all of the artifacts and field notes. One page of notes by Benjamin L. Smith pertain to the site and will be included in full here. Photographs of the artifacts were also taken.

The Dugans Brook Knoll Site was originally identified by Benjamin L. Smith as Site 20. Mr. Smith's notes are as follows:

Nut Meadow Brook, sometimes called Dugan's Brook, seems to have been an important fishing stream, as at least two Indian Camps were located on its banks.

One of these was situated on a small sandy knoll on the south bank, one hundred feet east of the Old Sudbury Road at the spot where it passes the Concord Country Club golf links.

We have always made it a practice to inspect all places which might have attracted the Indians, but as we had no real expectation that the knoll had ever been used as a camp site, we were rather surprised to find four small arrowheads and a handful of chips on our first inspection.

Later, proof was found that the Indians

also used the western end of the knoll across the road, and the same expectation showed that the large field to the southeast of the knolls produced scattered arrowheads over a wide area.

This location is in no sense an important one, and probably was occupied for a short time, but it is interesting for the reason that it indicates how thoroughly the Indians made use of every good fishing site in the valley, and it might also be taken as an indication that every available source of food had to be utilized at certain times of the year, or possibly during certain years (Smith nd).

The artifacts from the Dugans Brook Knoll Site (Figure 2) include diagnostic points from several temporal periods, most notably Late Archaic, with a rhyolite Merrimack/Small Stemmed I point, rhyolite and hornfels Brewerton Corner/Side Notched points, a mylonite Squibnocket/Small Triangle, a rhyolite Orient Fishtail point, two possible Middle Woodland Lanceolate points, a possible hornfels Middle Archaic Stark point, and several untyped triangle points, one of which resembles a rhyolite Hardaway-Dalton and another possibly a mylonite Large Triangle. The points recovered suggest a possible temporal span from the Early Archaic through to the Late Woodland period. At a minimum, the full span of the Late Archaic period (6000-3000 BP) is represented with diagnostic points, including a Transitional Archaic/Early Woodland point. While most of the artifacts recovered from the site are of rhyolite, examples of quartz, mylonite, meta-sediment and hornfels were present. These materials are consistent with the artifacts recovered from the location of the project. The location also accords well with Mr. Smith's location at "one hundred feet east of the Old Sudbury Road" (the Old Road to Nine Acre Corner).





**Figure 2. Photograph of Ben Smith collection from Dugans Brook Knoll Site.**

### **Dugans Brook Knoll Site (19-MD-151) Re-discovered**

JMA conducted an archaeological intensive (locational) survey in 2006 for a proposed water treatment facility located near Dugans Brook. The existing conditions included an open field and wooded, gently sloped ground. From a total of 41 test pits (50 x 50 cm) in two 30-x-30 m grids and one transect, 13 Native American lithic artifacts, including a Late Archaic Broad Eared/Brewerton point and 12 pieces of chipping debris, and five calcined bone fragments were recovered from six adjacent test pits. The discovery confirmed the location for the Dugans Brook Knoll Site (19-MD-151). Other areas tested contained only scattered historic or modern artifacts. A site examination was recommended and subsequently conducted for the Dugans Brook Knoll Site.

Site Boundaries: The site examination consisted of a total of 54 test pits in addition to the 20 intensive survey test pits at the site area. Test pits were set within an alpha-numeric grid that en-

compassed the intensive survey testing at 5-m intervals (Figure 3). The site examination defined the overall site maximum size as 45 m east-west by 40 m north-south through two consecutive sterile test pits or in combination with the limits of prior machine landscaping disturbance. Within this area there was a very low density of pre-Contact Native American artifacts, primarily flakes of stone from tool making or tool modification. Most of the artifacts were recovered from the plow zone, with only a few recovered from the B-horizon (subsoil). Test pits contained between one and three Native American artifacts, with the exception of intensive survey test pit B1-12, which contained six lithics, including the Broad Eared/Brewerton point as well as five pieces of calcined bone.

Most site examination test pits contained a plowed A-horizon (A-pz) with otherwise undisturbed stratigraphy like that encountered in Block 1. The dark yellowish brown (10YR 4/4) to brown (10YR 4/3, 5/3) silty sand A-pz varied in depth from 18 to 48 cm below surface (cmbs). The B1 horizon consisted of a yellowish brown



**Figure 3. EU 2 during excavation of the B1 horizon, view northeast.**

(10YR 5/8), dark yellowish brown (10YR 4/6), or olive yellow (2.5Y 6/6) fine sand and varied in depth from 34 to 60 cmbs. Below the B1, the B2 horizon consisted of a yellowish brown (10YR 5/6), or brownish yellow (10YR 6/6) fine sand with very few pebbles, to a variable bottom depth of 53 to 74 cmbs. The C horizon consisted of brownish yellow (10YR 6/6, 6/8) fine sand. Test pits were excavated to an average depth of 73 cmbs. Modern fill was encountered at several test pits at the western and northern fringe of the site and contained modern beer bottle glass, styrofoam, plastic and asphalt.

Site Integrity and Internal Patterning: Based on the 74 test pits excavated within and around the Dugans Brook Knoll Site at 5-m intervals, plowing has affected the integrity of most of the site, as most artifacts were recovered in the plow zone. The western margin of the site, from which several flakes were recovered, had loam removal, soil truncation, disturbance and fill related to landscaping on the east side of the exist-

ing well house and from associated utilities and asphalt or gravel pavement. Lithic artifact occurrence drops off before reaching this disturbed area. The north edge of the site had several berms of fill with concrete rubble and modern bottle glass. The area sloped gently toward Dugans Brook, and the occurrence of lithic artifacts dropped off before the wetland vegetation was encountered. The central, southern and eastern portions of the site were undisturbed except for plowing, with few artifacts recovered below the plow zone.

Only test pit B1-12 contained more than three lithic artifacts: six in total including the Eared-Notched/Brewerton point. Five calcined bone fragments were also recovered, three in the plow zone and two in the B horizon. The six lithic artifacts were recovered in the B horizon. This was the location of the only lithic or calcined bone concentration and the location of the only diagnostic artifact recovered. As a result, two excavation units (EUs) were placed in this

Grid	A	B	C	D	E	F	G	H	I	J	K	L
12	nd	nd	nd	nd	nd	nd	nd	0	nd	nd	nd	nd
11	nd	nd	nd	nd	nd	0	nd	0	nd	nd	nd	nd
10	0*	nd	nd	0	0*	1	0	1	0	0	nd	nd
9	nd	nd	0*	2	0	2	0*	2	0	0	nd	nd
8	0*	Dist.	nd	0	0*	0	0*	0	0	0	nd	nd
7	nd	Dist.	0*	0	0	1	1*	2*	1	0	0	nd
6	0*	1	0	1*	1*	1	2	0	1	1	0	0
5	nd	Dist.	0*	3	0	3	6*	2*	2	0*	0	nd
4	0*	Dist.	nd	0	0*	3	0*	0	1	0	0	nd
3	nd	nd	nd	0	0	1	0	0	0	nd	nd	nd
2	nd	nd	nd	nd	nd	0	nd	nd	0	nd	nd	nd

\*Intensive Survey test pit; nd = no data (not excavated); Dist = Not dug due to disturbance.

**Figure 4.** Native American lithic artifacts recovered per grid test pit at the Dugans Brook Knoll Site.

area with EU 1 to the east and EU 2 to the west.

The soil stratigraphy of EUs 1 and 2 consisted of A0, A-pz, B1, B2 and C1 horizons without any evidence of modern disturbance. A total of 37 flakes of stone from tool making were recovered from EU 1, but there were no additional tools and only five pieces of calcined bone. The calcined bone and several flakes were recovered from the A-pz horizon, with additional flakes from the B horizon.

EU 2 (Figure 4) recovered fewer flakes than EU 1 and no tools, but a large number of calcined bone fragments (n = 50) were scattered throughout the B-horizon (Figure 5) with most noted in

the SW corner of the unit. This suggested that a hearth feature was located near that area, most likely to the south or southwest.

Based on the likelihood of an intact hearth being located near EU 2 with associated activity areas nearby, the site examination was expanded to include additional test pits and excavation units in the immediate vicinity. As defined, the area of potential significance was confined to an area 7 m x 7 m and centered on test pit B1-12. This boundary of this area was defined by test pits with three or fewer lithic artifacts and no calcined bone. The expanded site examination was subsequently approved by the Massachusetts Historical Commission. JMA sent a letter adden-





**Figure 5. EU 2 southwest quadrant with calcined bone, view west.**

dum summarizing the findings and the scope of the expanded site examination on April 18, 2006.

#### Expanded Site Examination:

The principal site core area was subjected to 2.5 m-interval testing with 50 x 50 cm test pits and the subsequent excavation of six additional 1 x 1 m excavation units (EUs 3-8). Eight additional test pits were excavated around intensive survey test pit B1-12 at 2.5 m intervals. These test pits were designated FG-5, FG-5N, FG-5S, G-5N, G-5S, GH-5, GH-5N and GH-5S. Only two to four Native American stone artifacts were recovered from six of the test pits (Figure 6). Artifacts recovered included a large rhyolite biface tip from the plow zone of GH-5S and an intact quartzite Small Stemmed point from the lower plow zone of FG-5N. Test pits FG-5, FG-5N, FG-5S, G-5S, GH-5, and GH-5S had two or three flakes (rhyolite, hornfels, or quartzite). One or more cobbles, possibly hammer stones, were also recovered. Two test pits, G-5N and GH-5N, did not yield any Native American artifacts. A calcined bone concentration was noted at FG-5,



**Figure 7. EU 8 at top of B horizon with Feature 2 hearth in southeast quad.**

a meter west of a a meter west of EU 2, and GH-5 had two pieces of calcined bone with a possible post mold (Feature 1) noted in the west half of the test pit. This information indicated that the principal site area was oriented east and west of test pit B1-12, with diminishing artifacts to the north and south. These eight test pits all contained historic and modern field trash from the plow zone (primarily coal products, bottle glass, redware, whiteware, ironstone and ferrous metal).

EUs 3 and 4 were located south and southwest of EU 2 (Figure 5), where the calcined bone concentration was first identified. A hearth was conjectured to be in this area. EU 5 was located adjoining the west side of test pit GH-5 to investigate a possible post mold. EUs 3 and 4 produced less than expected quantities of flakes and calcined bone. Fine screening (1/8") by quadrants was conducted for the top two 5-cm levels of the B horizon in EUs 3 and 4, with few pieces of calcined bone recovered, except for a moderate increase in the NW quad of EU 4. As a result, EUs 6 and 7 were located north of EU 4 and west of EU 2, encompassing test pit FG-5. Fine screening (1/8") by quadrants was conducted for the top two 5-cm levels of the B hori-

Grid designation within core area	F	FG	G	GH	H
6	1	nd	2	nd	0
5N	nd	2	0	0	nd
5	3	4	6*	3	2*
5S	nd	2	3	3	nd
4	3	nd	0*	nd	0

\*Intensive Survey test pit; nd = no data (not excavated).

**Figure 7.** Total Native American lithic artifacts recovered per test pit within Dugans Brook Knoll Site core area.

cined bone and microflakes recovered, except for a decrease in the NW quad of EU 7. A Brewerton point base was recovered from EU 7. No burnt soil was present in EUs 6 and 7, however, and quantities of calcined bone appeared to be dropping off to the west.

EU 5 was located east of EU 1 and adjoined the west side of test pit GH-5. EU 5 had a greater density of chipping debris, including numerous trim flakes, than EU 1. The possible post mold (Feature 1) measured 18 cm north-south by 17 cm east-west with dark yellowish brown (10YR 3/6) silty sand. Several charcoal flecks were present within the faint stain. In cross section the stain disappeared within a few centimeters.

The north side of EU 5 had another small stain (Feature 2a) with some strong brown soil around it. The cross section of the stain was more defined and vertically tapered like a post mold; it contained charcoal chunks larger than previously seen on site either in the plow zone or in the subsoil. The feature was noted as a possible post mold or tree root burn. The bisection of Feature 2a revealed a tapered dark brown (10YR 3/3) stain with charcoal extending from 28 to 50 cm below datum (cmbs). Below this,

patchy staining of yellowish brown (10YR 5/6) silty sand continued trending westward through the brownish yellow (10YR 6/6) B2 horizon down into the light yellowish brown (2.5Y 6/4) C horizon to a depth of 75 cmbs.

EU 8 was located to the north adjoining EU 5 to investigate whether Feature 2a was cultural in origin or a tree burn. Excavation of EU 8 came down on and exposed the western two-thirds of a well preserved hearth feature, approximately 60 cm in diameter and indistinct at its edges (Feature 2, Figures 6, 8 through 12). This was immediately below the plow zone at a depth of 32 cmbs. Feature 2a was now considered a probable post mold, and the surrounding strong brown soil formed the southern boundary of the hearth. Feature 2 consisted of fire-reddened soil with darker more consistent strong brown (7.5YR 4/6), brown (7.5YR 4/4) and dark brown (7.5YR 3/4) soil in the east half of the southeast quad, with patches of strong brown (7.5YR 4/6) and dark yellowish brown (10YR 4/6) soil at the amorphous edges of the feature to the south, west and north. Patches or streaks of yellowish brown (10YR5/6) soil sometimes ran between west and north. Patches or streaks of yellowish brown (10YR 5/6) soil sometimes ran between



west and north. Patches or streaks of yellowish brown (10YR 5/6) soil sometimes ran between strong brown patches, probably the result of bioturbation.

The adjacent NW and SW quads of EU 8 were excavated and fine screened (1/8") until flakes and calcined bone dropped off in the B2 horizon. The western quads were then excavated down into the sterile C horizon and screened with 1/4" wire mesh. The Feature 2/hearth was then bisected and excavated in 5-cm levels, with soil samples and photographs taken from each half by level. A second possible post mold was observed at the northern edge of the hearth at a depth of 40 cmbs and identified as Feature 2b. The possible post mold consisted of a dark yellowish brown (10YR 4/6) stain 12 cm x 8 cm with charcoal flecks and tapering in cross-section.

The bisected Feature 2/hearth in profile appeared as strong brown in color from 10 to 15 cm in depth and was deepest at the southern edge. The eastern portion of the hearth was then excavated, and became more distinct as it diminished in size at a depth of 43 cmbs. The hearth appeared rounded and 30 cm north-south by 23 cm east-west, including an arc-like stain about 15 x 8-cm of very dark brown (10YR 2/2) soil with charcoal flecks was present along the northwest side of the strong brown (7.5YR 4/6) hearth soil (Figure 8). The edges of the hearth-reddened soil graded to dark yellowish brown (10YR 4/4) to the south and northeast.

By 53 cmbs, the reddened soil had disappeared, although a small 10-cm wide stain continued from 53 to 68 cmbs where the arc-like stain had been. This stain consisted of dark yellowish brown (10YR 4/4) silty sand with charcoal flecks. This continuation of the stain may be a distinct post mold feature within the hearth. From 53 to

To 68 cm the stain was identified as Feature 2C. It was noted that the soil within the feature was not burned like the surrounding matrix, however, the greater depth of Feature 2c and the abundance of charcoal made it a good choice for radiocarbon dating. Features 2a, 2b and 2c are considered to be post molds adjacent or within the Feature 2 hearth. Similarities in size (about 15-18 cm in diameter) and depth (to the C horizon), with charcoal in the upper 15 cm of all three and throughout Feature 2c, suggest that all three are contemporary. If the post molds are contemporary with the hearth, then they may represent scaffolding for cooking over the hearth. The post molds may also date to a later period than the hearth, as the post molds could have been cut through an earlier hearth feature. A portion of the hearth Feature 2 continued beyond the east wall of EU 8 and was documented in the east wall profile (Figure 12).

### Recovered Artifacts

A total recovery of 498 Native American chipped lithic artifacts were recovered from the site examination and intensive survey and consist of: three Broad Eared/Brewerton Eared Notched points or point bases (2 rhyolite, 1 quartzite); one meta-quartzite Small Stemmed point; two point tips (rhyolite and fine-grained unidentified - possibly chert) (Figure 14); one rhyolite biface edge fragment; one argillite uniface; and 490 flakes/shatter (415 rhyolite; 4 rhyolitic tuff; 1 fine-grained unidentified, 1 granite, 39 hornfels, 6 quartz and 24 quartzite). In addition, two abrading stones, six possible hammerstones or utilized cobbles, one notched cobble (possibly a simple plummet), 38 fire-cracked or fire-affected rocks, one piece of ocher and 617 pieces of calcined bone were recovered ((Figure 13).

Over 92% of the chipped lithics and all but three of the 617 calcined bone fragments were recovered from the 7-x-7 sq m site core where the expanded site examination was focused (Figure 10). Outside of this area there was a low density of rhyolite, hornfels, quartz and quartzite debitage, an argillite uniface and three calcined bone fragments. The large quantities of lithics and bone fragments are indicative of a central locus of activities, outside of which few artifacts occur. The eight excavation units and nine test pits within the site core consist of an excavation area of 10.25 sq m, compared to 16.75 sq m (of test pits) outside of the site core area from the site examination test pits, intensive survey Block 1 test pits and JTP 3. Lithic artifact density at 2.27 artifacts per square meter outside the site core can be compared to 44.88 artifacts per square meter within the site core. While fine screening was responsible for recovering more microflakes (<10mm) within the site core, artifact densities would still be over ten times greater in the site core if microflakes were excluded from the count.

Hornfels and rhyolite each contributed nearly 40% of the lithic assemblage outside the site core, while rhyolite comprised 88.5% and horn-



**Figure 8. Northeast overview of EU 8, with Feature 2 hearth on pedestal in southeast quad.**



**Figure 9. EU 8 with Feature 2 hearth and Fea-fels and quartzite each comprised only 5% of the lithic assemblage within the site core.**

Stratigraphically, the plowed A horizon produced 31% of the chipped lithics, with 63% of the chipped lithics recovered from the B horizon, 4.6% from Feature 2, and one flake from the top of the C horizon (Figure 15). Stratigraphically, the plowed A horizon produced only 2% of the calcined bone, with 85% of the calcined bone recovered from the B horizon and 13% from Feature 2. Over 99% of the chipped lithics, calcined bone and fire-cracked rock recovered from below the A horizon across the site came from the site core.

Outside of the site core, most chipped lithics and all calcined bone were recovered from the A horizon. Similar quantities of historic materials were recovered from the A and B horizons both within and outside of the site core, with only trace amounts of historic materials from below the A horizon. Shell fragments had a similar stratigraphic distribution to that of historic materials. Fill on the site periphery contributed a large quantity of modern materials but no pre-Contact artifacts or calcined bone. The distribution pattern of pre-Contact artifacts at the site indicates a concise and restricted site core area

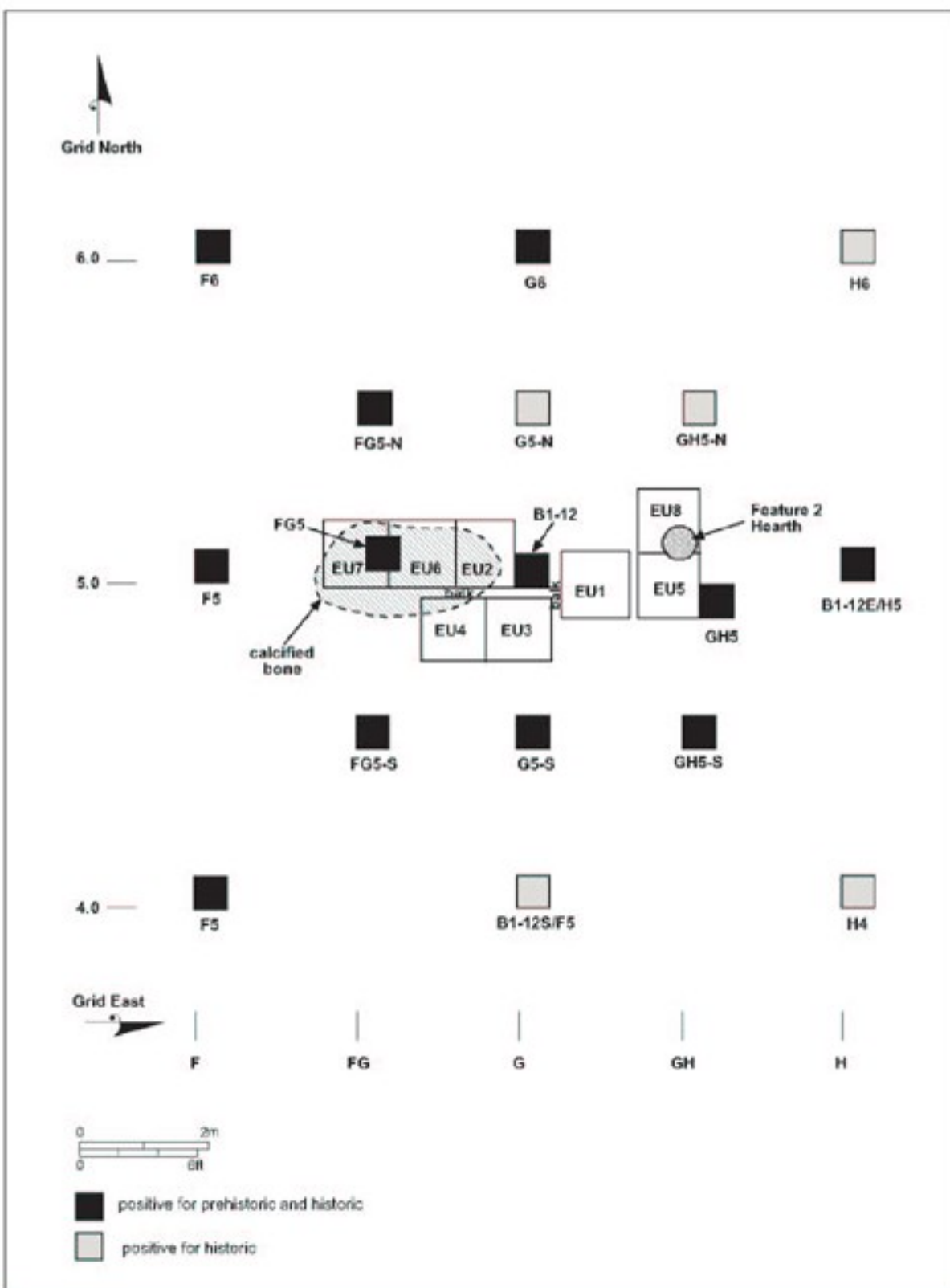


Figure 10. Plan of Site Examination Units and Adjacent Test Pits

with most pre-Contact materials having come from an intact B horizon or feature context in the B horizon. Larger artifacts, including bifaces, fire-cracked or fire-affected rock or cobbles tools were more likely to have been recovered from the plow zone.

In addition to the pre-Contact Native American artifacts and related materials, 930 historic artifacts, excluding shell, were recovered from the site examination, 44% of the total quantity of the recovered artifacts from the site examination. About half of the historic artifacts consist of modern bottle glass, modern synthetic materials,

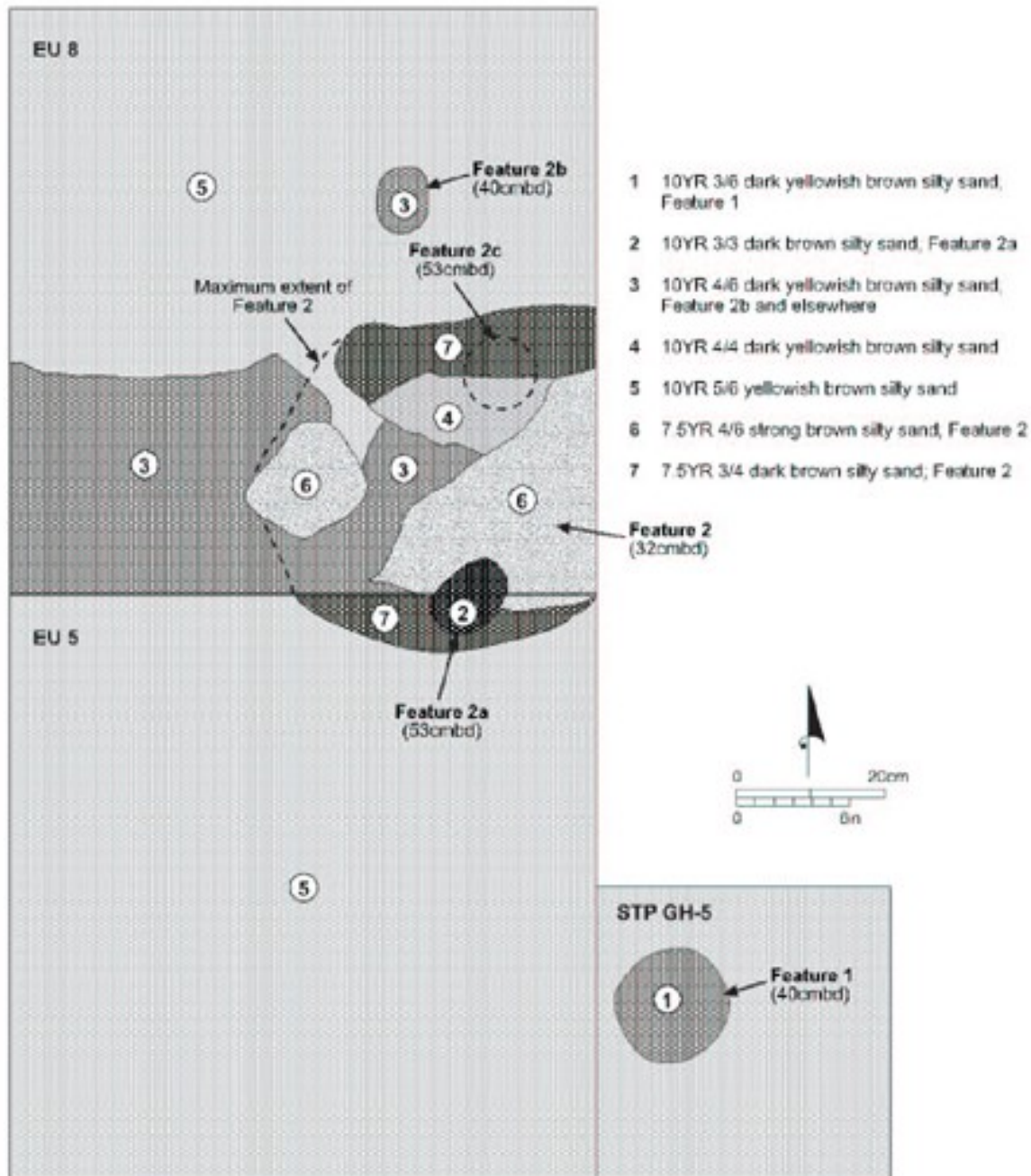
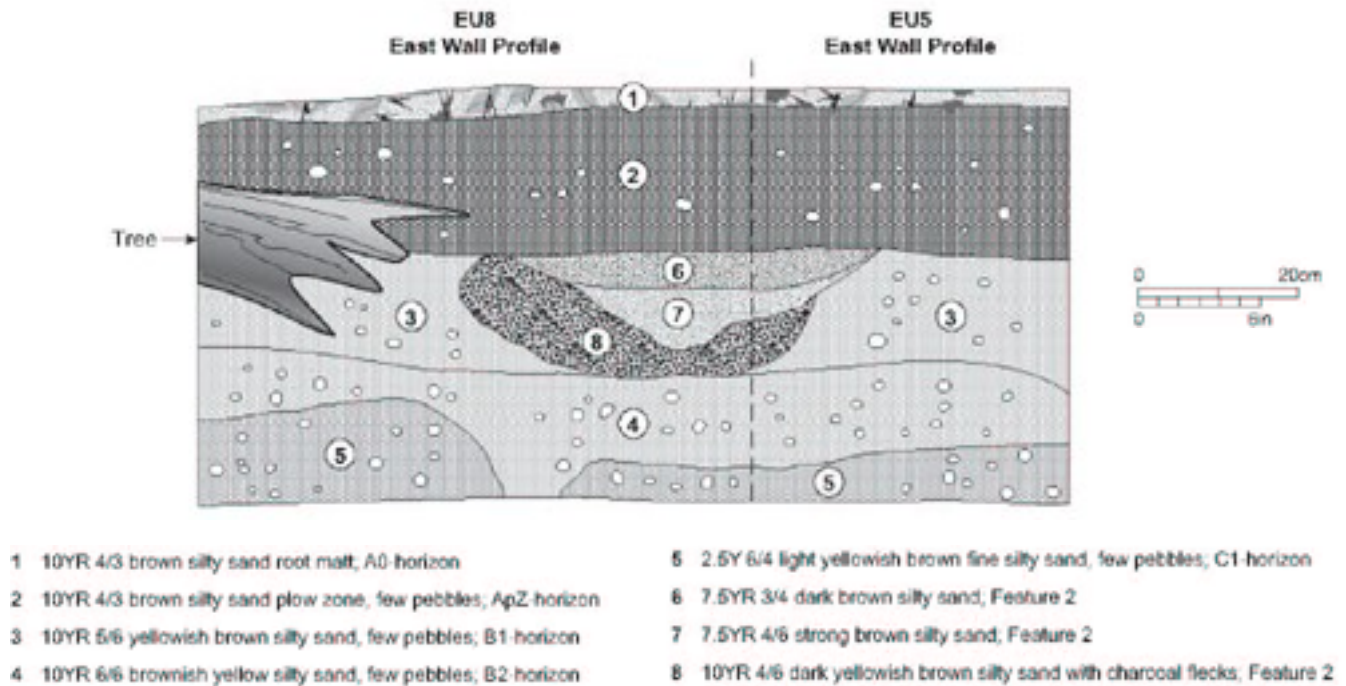


Figure 11. Plan of Site Examination Excavation Units 5 and 8 with Features 1 and 2





**Figure 12. Soil profile of the east wall of Excavation Units 8 and 5 with Feature 2**

or modern metal items such as aluminum or bottle caps. Another 16% of the historic assemblage consisted of coal-related products. Architectural artifacts contributed 9% of the assemblage, which included a few cut or wrought nails. Domestic ceramics, table or lamp glass, older bottle glass (free-blown, mold-blown and mold-blown/machine-made), and tobacco pipe fragments contributed 19% of the assemblage. The domestic ceramics and other eighteenth and nineteenth century artifacts probably represent incidental field trash from agricultural practices when the field was actively plowed. Agricultural practices often included the spreading of manure, which would account for some historic refuse, and sometimes “night soil” from privies, which was typically rich in artifacts from refuse disposal in privies. Most of the historic assemblage consisted of small fragments. A cow bone and 35 shell fragments are also included. The shell fragments could date from pre-Contact times; however, most of the shell was recovered

from the plow zone and none from below the plow zone in the site core area. Some shell fragments could be identified as oyster or quahog, historically common shell fish that were not present at the pre-Contact Clamshell Bluff site.

### Radiocarbon Dating

A sample of charcoal recovered from within the hearth, Feature 2c, was sent to Geochron laboratories for dating. A sample of 6.7 g of charcoal chunks was selected from a depth of 53-63 cmbs. After cleaning the sample at Geochron for dating, the amount of charcoal was about half of the original sample, necessitating extended counting. The radiocarbon age determination was  $2430 \pm 60$  years BP (GX-32660), with a calibrated date range of 2736 to 2341 bp at two sigma.

The date of the charcoal is consistent with an



Material	Intensive Survey Test Pits	Site Exam Grid Test Pits	Expanded Phase Test Pits	EUs	To- tals
Rhyolite Brewerton point	1	0	0	1	2
Rhyolite biface edge fragment	0	0	0	1	1
Rhyolite point tip	0	0	0	1	1
Rhyolite secondary flakes	4	12	10	379	405
Rhyolite decortification flakes	0	1	1	4	6
Rhyolite secondary shatter	0	0	0	1	1
Rhyolite decort. shatter*	0	0	1	2	3
Rhyolitic tuff secondary flakes/shatter	4	0	0	0	4
Fine-grained unidentified, point tip	0	0	1	0	1
Fine-grained unidentified sec- ondary flake	0	0	0	1	1
Granite secondary flake	0	0	0	1	1
Hornfels secondary flakes	4	11	3	21	39
Meta-quartzite Small Stemmed point	0	0	1	0	1
Quartzite Brewerton point	0	0	0	1	1
Quartzite secondary flakes	0	1	2	21	24
Quartz secondary flakes	0	1	0	1	2
Quartz decortification flakes	0	3	0	0	3
Quartz decortification shatter	0	0	0	1	1
Argillite uniface	0	1	0	0	1
Abrading stones	0	0	0	2	2
Possible hammer stones	0	0	2	1	3
Possible utilized cobbles	0	0	1	2	3
Notched siltstone cobble	0	0	1	0	1
Fire-cracked/fire-affected rock	0	1	1	36	38
Ocher	0	0	0	1	1
Calcined animal bone	5	3	26	583	617
<b>TOTALS</b>	18	34	50	1061	1163

\*Maroon rhyolite from plow zone, possibly road gravel.

**Figure 13. Native American artifacts and calcined bone recovered from the Site Examination.**



**Figure 14. Bifaces from Dugans Brook Knoll Site excavation; left to right: Brewerton Eared Notched (test pit B1-12), point/bifacial blade tip (test pit GH-5S), point tip (EU 8), Brewerton Eared Notched (EU 8), Brewerton Eared Notched (EU 7), and Small Stemmed III point (test pit FG-5N).**

Early Woodland occupation, which is supported by a Small Stemmed point recovered from a test pit 5 m to the west of the hearth. However, a date of 4,000 to 5,000 years BP had been anticipated based on the Laurentian period Brewerton points found at the site (Johnson and Mahlstedt 1984). No diagnostic points were recovered from Features 2, 2a, 2b or 2c, although calcined bone was present within Feature 2. A Brewerton point was recovered from the plow zone 20 cm north of the hearth. Another Brewerton point base was recovered in the calcined bone concentration in the B1 horizon of EU 7. As a result, the dating of Feature 2c brings up several possible issues that bear on the interpretation of the site.

The first issue is whether the radiocarbon date is representative of either Feature 2c or Feature 2. Feature 2c may have been an intrusive pit or post mold from the Early Woodland cut into a Late Archaic Laurentian period hearth. The fact that the soil did not appear fire-reddened within

Feature 2c and that it was distinctive from the strong brown surrounding matrix of Feature 2 may support this. Feature 2c continued deeper as a tapering stain to the top of the C horizon and may have been a post mold intruding through an earlier hearth. The selection of charcoal chunks from Feature 2c for radiocarbon dating was done with care so that any obvious contaminants were removed. It seems likely that the dating of the sample was accurate. If so, then the issue is whether the Feature 2 hearth dates from the Late Archaic Laurentian period or the Early Woodland. The presence of minimal charcoal within Feature 2 is unlike Features 2a and 2c, which contained noticeable chunks of charcoal. On the other hand, charcoal chunks of comparable size were not recovered from the B horizon elsewhere on the site, only within Features 2a and 2c located within Feature 2; therefore, the Feature 2 hearth may be contemporary with Features 2a and 2c.

Material/Context	Fill	A hor.	B hor.	Feat. 2	C hor.	Totals
Chipped lithics, site core EUs and test pits	0	136	312	23	1	472
Calcined bone, site core EUs and test pits	0	8	526	80	0	614
Fire-affected rock, cobble tools and ocher, site core EUs and test pits	0	26	21	0	0	47
Calcined bone, test pits outside site core	0	3	0	0	0	3
Chipped lithics from test pits outside site core	0	21	5	0	0	26
Fire-affected rock from test pits outside site core	0	0	1	0	0	1
Historic materials, site core EUs and test pits	0	321	6	0	0	327
Historic materials, test pits outside site core	365	345	10	0	0	720
Shell, site core EUs and test pits	0	26	0	0	0	26
Shell from test pits outside site core	1	13	3	0	0	17
<b>TOTALS</b>	366	899	884	103	1	2253

**Figure 15. Artifacts and other materials recovered from the Dugans Brook Knoll Site by strata from the Intensive Survey and Site Examination.**

A second issue is the relationship of the calcined bone concentration in EUs 2, 6 and 7 with the Feature 2 hearth. A hearth was anticipated in close proximity to the calcined bone concentration but was never found. If the hearth was located to the north, west or southwest of the calcined bone concentration, then the it may have been outside of the excavated area. It is also possible that the calcined bone concentration represents the remains of hearth cleaning and maintenance activities conducted on Feature 2. The hearth may have been routinely scooped clean and the charcoal and burned bone dumped to the west. The exposure of charcoal and bone on the ground surface would have contributed to the disintegration of most pieces, while smaller pieces may have been buried through bioturbation.

A third issue is the relationship of the lithic materials to the radiocarbon date. The recovery of rhyolite and quartzite Brewerton points, hundreds of rhyolite trim flakes and smaller numbers of quartzite and hornfels flakes, suggests tool kit maintenance associated with Laurentian tools. The Ben Smith collection included Brewerton points made of rhyolite and hornfels. The Small Stemmed point recovered from this excavation was made of a greenish meta-quartzite, probably mylonite. No similar flakes were recovered. A mylonite Squibnocket Triangle point, dating from the Late or Terminal Archaic, was present in the Ben Smith collection. The radiocarbon date on Feature 2c is much too young for a Laurentian context and is consistent with the Small Stemmed point. Quartz was very scarce at

the site, although quartz is common for Early Woodland sites with Small Stemmed points. If some of the lithics from the excavated site area date from an Early Woodland context, then rhyolite must have been the preferred lithic material. A rhyolite Merrimack/Small Stemmed point, dating from either the Late Archaic or Early Woodland, and a rhyolite Orient Fishtail point dating from the Terminal Archaic or Early Woodland were present in the Ben Smith collection from the site. Based upon the recovery of rhyolite, hornfels and quartzite Brewerton points from the excavated portion of the site and/or from the Ben Smith collection, the concentration of chipping debris made from these materials is considered to be associated with a Laurentian period occupation.

### Faunal Analysis

A total of 625 specimens identified as calcined bone and excavated from the Dugans Brook Knoll Site were submitted to Ms. Tonya Largy, a specialist in faunal and botanical analysis for the region. The faunal material was recovered from six test pits (B1-12, D9, FG-5, GH-5, H-3, L-6) and eight excavation units (EU 1 through EU 8). Calcined bone was present in three features. Feature 2a was encountered in EU 5 and Features 2 and 2c were encountered in EU 8.

All specimens were examined under magnification ranging from 5X to 100X using a Wild M3 Zoom stereomicroscope with double fiber optic lighting. All fragments were identified to the nearest taxonomic category possible given their small size. Identifications were based on morphology, bone structure, size and thickness of the fragment.

Although 625 fragments were submitted as calcined bone, in actuality biological materials consist of 617 bone fragments and two fragments of

much degraded bivalves. Other non-bone materials include one uncharred plant stem, a charred wood fragment, three pebbles, and one clay pipe bowl fragment. In addition, several bone fragments were found to be all part of one bone in the same lot, further reducing the fragment count. Therefore the total count of bone specimens is 610.

In general, the condition of the fragments was found. Artifacts that remain at the site include a few diagnostic chipped lithic tools, but primarily consist of stone waste flakes, most of which are of rhyolite or hornfels. Most of the artifacts outside the site core were recovered from the plow zone. Landscaping and/or truncation were evident near the western and northern margin of the site.

As initially defined by test pits with few to no lithic artifacts and no calcined bone, the core area of the site was confined to an area approximately 7 m x 7 m and centered on test pit B1-12. This area had been less affected by plowing and contained numerous artifacts and calcined bone fragments in the B horizon that appear related to activity areas centered around a hearth. Plowing truncated the site core to some extent, but the upper B horizon still contained features with concentrations of cultural materials – most notably calcined bone and chipping waste, associated with diagnostic Laurentian/Brewerton projectile points.

As set forth in the research design, three research questions can be examined at the Dugans Brook Knoll Site (19-MD-151):

- 1) What were the temporal affiliations of the activity areas at the site?

Within the site core area, partially intact activity areas were identified in the B-horizon, including a hearth, tool modification/maintenance activity

areas and a midden lens with calcined bone, charcoal flecks and waste flakes. Plowing had truncated this area to some extent, but most Native American artifacts and calcined bone fragments were recovered below the plow zone in the intact B horizon. Several possible post molds, a hearth, and a calcined bone concentration, conjectured to be redeposited hearth refuse, were identified, along with diagnostic Brewerton-style projectile points, related chipping debris from tool modification/tool making activities, and a Small Stemmed point. An Early Woodland radiocarbon date obtained on charcoal from Feature 2c complicates the interpretation of the site as a single component Laurentian-Phase campsite. The intact features in this area contain information relating to short-term activity areas and food remains possibly associated with two small camps, one Late Archaic Laurentian Phase and one Early Woodland in date. The knoll's location along the Sudbury River and adjacent to Dugans Brook would have made it an attractive place for campsites throughout the pre-Contact period.

2) What were the resources being extracted, and at what seasons would they have been available?

The calcined bone concentration in EUs 2, 6 and 7 consisted of a scatter of white calcined bone fragments over a 2.5 m-long (east-west) by 1 m. wide (north-south) area in the top 5-cm level of the B horizon. No pit feature or burning/reddening of the soil was present. The occurrence of calcined bone in the second 5-cm level of the B horizon was markedly less, most pieces were noted in the upper 2-cm. Very few fragments of calcined bone were evident below this. This was also true for flakes, microflakes, and charcoal flecks. The calcined bone concentration is interpreted as redeposited refuse from hearth maintenance. The presence of small calcined bone and charcoal flecks, along with flakes and

poor. This, plus their small size, precluded identification to class. Thirty-seven percent (64% by count) are listed as "indeterminate". The majority (35% by count) are identified as mammal or strongly resemble mammal, while 1% may be either mammal or bird. Only one fragment could be identified to genus, a proximal phalanx of deer (*Odocoileus* sp.). Several other fragments resembled foot bones of a medium/large mammal. The size of several fragments suggested they represent small mammals. One rib shaft of a small mammal was identifiable. It was suggested by Ms. Largy that bone labeled as "indeterminate" is likely mammal bone.

Ms. Largy concludes that the fact that no bone was identifiable as turtle or fish in this sample is significant. The presence of deer and small mammal suggests that this particular site was not occupied in the spring through summer as was the nearby site of the Concord Shell Heap, which was found to be a summer habitation (Downs 1995; Largy 1995; Rhodin 1995).

## Site Significance

Determination of Site Boundaries: The site examination defined the overall site maximum size as 45 m east-west by 40 m north-south through two consecutive sterile test pits or in combination with the limits of prior machine landscaping disturbance. Within this area there is a site core measuring approximately 7 m east-west by 7 m north-south.

Assessment of Integrity: The results of the site examination indicate that outside of the site core area, the Dugans Brook Knoll Site has a low density and low diversity of artifacts across most of the defined site area. The low diversity of artifacts may be due in part to the removal of diagnostic artifacts through past collecting by Ben Smith or others without detailed provenience information on where specific tools were



microflakes, suggests that the hearth was periodically cleaned out, with the ash and burned bone being scooped up and dumped 2.5 to 5 m west of the hearth. Such hearth maintenance would imply campsite use probably exceeding two or three days duration and possibly lasting several weeks. The small size of the site suggests that a small group, probably several individuals or a family, were camped at the site. No expedient tools have been identified from the core area of the site.

No shell, fish bone or turtle bone has been identified in association with the B-horizon features and calcined bone deposits. A few shell fragments were encountered in the plow zone and B1 horizon of the site, but no association has been made with Native American artifacts. Whether the campsite had a special focus on hunting or a more general focus on hunting/fishing and gathering cannot be deduced. The presence of deer and small mammal suggests that this particular site was not occupied in the spring through summer as was the nearby site of the Concord Shell Heap, which was found to be a summer habitation. No charred nutshell was identified at the site. While nutshell is often associated with autumn and winter occupations, it is possible that the Dugans Brook Knoll Site was occupied in the autumn or winter but had a restricted focus - that of a hunting camp and not more generalized foraging which would have included nutmeat processing.

### 3) What types of lithic procurement, modification and use were present at the site?

The concentration of rhyolite, hornfels and quartzite debitage from the site core area indicates tool modification and re-sharpening; two broken point tips and three Brewerton-base points, each missing tips (representing five different bifacial tools), suggest tool discard due to breakage. An intact quartzite Small Stemmed

point was recovered from outside this area in test pit FG-5N in the plow zone and has an unclear association with the core area of the site although it is consistent with the Early Woodland radiocarbon date obtained on Feature 2c.

No primary reduction or initial tool production has been evident from the site core; it appears that primarily complete tools were being re-sharpened and/or reshaped, as very few larger thinning flakes (>25mm) were recovered. Most flakes were smaller than 15mm in size and are consistent with the pressure flaking/trimming of bifacial tool edges. Out of 483 flakes, only four flakes were larger than 25mm. These four flakes consist of one rhyolite (25-35mm) and two hornfels (25-35, 35-45mm) secondary flakes from the site core and one quartz decortification flake (25-35mm) from outside of the site core. Broken bifacial tools at the site include projectile points and one larger blade. The numerous microflakes at the site suggest that numerous bifaces were trimmed or sharpened, a pattern that appears consistent with a hunting camp.

Rhyolite predominated at the site, with gray to dark gray and black being most common. Gray and black rhyolites outcrop in the Lynn and Newbury volcanics north of Boston. Gray rhyolite may also outcrop at other locations in eastern Massachusetts (Johnson and Mahlstedt 1984:224). Weathered tan/gray to black hornfels was also present in small quantities in the assemblage. Hornfels quarries are known from the Blue Hills in eastern Massachusetts (Johnson and Mahlstedt 1984:227) and Mount Ossipee in New Hampshire. Blue Hills hornfels is dark gray to black on fresh surfaces, weathering to brown or tan; Mount Ossipee hornfels is black on fresh surfaces. Tan to gray quartzite was present in small quantities and appears macroscopically consistent with Westboro quartzite, common in the Sudbury and Assabet drainages (Johnson and Mahlstedt 1984:229). The lithic ma-

terials suggest a focus on acquisition of Boston Basin rhyolites, with some use of more local quartzites and more distant hornfels. Quartz does not appear to have been utilized within the site core.

The Dugans Brook Knoll Site (19-MD-151) consists of what is described by Shirley Blancke as a camp or fishing site located on a sandy knoll south of Dugans Brook (MHC site form). Artifacts from the site were collected by Ben Smith in the 1940s and include seven Late Archaic points including Laurentian Tradition Brewerton points and Narrow Point Tradition Small Triangle and Small Stem points, and a Transitional Archaic to Early Woodland Orient Fishtail point. The variety of diagnostic points discovered by Ben Smith suggest a multi-component site used occasionally over the span of several thousand years (ca. 5000-2000 BP). The results of the site examination support the conclusion that the site has at least two components, including a Laurentian Phase camp and an early Woodland camp. The evidence at hand suggest a focus on hunting and not fishing, unlike the fresh water clamshell middens of the Clamshell Bluff Site (19-MD-388, 19-MD-116).

## Summary

The Dugans Brook Knoll Site (19-MD-151) in Concord Massachusetts was first identified by Benjamin L. Smith, who collected artifacts, including Archaic and Woodland period points, from plowed fields across a broader site area in the 1940s. The site was re-identified during an archaeological intensive survey for a water treatment facility. A site examination was conducted with over 60 systematic test pits defining a site area 45 m x 40 m. Eight 1 m x 1 m excavation units investigated artifact concentrations. A hearth, calcined bone concentration and tool maintenance areas were identified.

The site is interpreted as consisting of short-term Laurentian Late Archaic and Early Wood-land campsites associated with tools of rhyolite, hornfels and quartzite. A radiocarbon date of  $2430 \pm 60$  years BP was obtained on a charcoal deposit from a feature. Over 600 calcined bone fragments and 498 Native American chipped lithic artifacts were recovered from the site examination, including three Brewerton/Broad Eared points and one Small Stemmed point. Partially truncated but otherwise intact features and activity areas were defined within the core area of the site, an area measuring less than 10 m by 5 m in size. Within this area, some 20% of the approximately 50 sq m area has been excavated, with the archaeological recovery of approximately two-thirds of a hearth, a midden lens with calcined bone, and adjacent tool chipping/modification activity areas.

The Dugans Brook Knoll Site (19-MD-151) contains features and artifact patterns dating from the Late Archaic and Early Woodland that retain integrity and can address research questions relevant to how Native groups utilized the resources available within this section of Concord near the Sudbury River. The site can contribute to our understanding of other research issues such as changing or evolving adaptive strategies, and exploitation of various resources available at different times in Concord, and the procurement and use of lithic materials.

The archaeological site examination sufficiently sampled the Dugans Brook Knoll Site within the project impact area and no additional archaeological investigation is recommended for the project as proposed (MHC letter dated May 24, 2006).

## References Cited

- Begley, William and Duncan Ritchie  
 1998 Intensive (Locational) Archaeological Survey, Robinson Well Project Area, MHC No. RC 20211, Concord, Massachusetts. Report on file at the Massachusetts Historical Commission, Boston, MA.
- Binzen, Timothy L. and Christopher L. Donta  
 2001 Archaeological Site Examinations of the Crosby Corner Locus of Site 19-MD-118 and the White-Walker Site for the Route 2 Crosby Corner Transportation Improvement Project Concord and Lincoln, Massachusetts. Report on file at the Massachusetts Historical Commission, Boston, MA.
- Blancke, Shirley  
 1987 Archaeological Site Examination of the Bedford Street Housing, Asparagus Farm Area, Concord, Massachusetts. Report on file at the Massachusetts Historical Commission, Boston, MA.  
 1988 Bedford Street Survey, Concord, Massachusetts. Report on file at the Massachusetts Historical Commission, Boston, MA.  
 1998 Volunteer Intensive Archaeological Survey of the Sleepy Hollow North Cemetery Expansion: Final Report. Report on file at the Massachusetts Historical Commission, Boston, MA.  
 1999 Archaeological Data Recovery at Sleepy Hollow North Cemetery Expansion: Final Report, Phase I, Concord, Massachusetts. Report on file at the Massachusetts Historical Commission, Boston, MA.  
 2003 Archaeological Data Recovery at Sleepy Hollow North Cemetery Expansion: Final Report, Phase II, Concord, Massachusetts. Report on file at the Massachusetts Historical Commission, Boston, MA.
- Davin, Ann K.  
 1985 An Intensive Level Archaeological Survey of the Emerson Hospital Project Area, Concord, Massachusetts. Report on file at the Massachusetts Historical Commission, Boston, MA.
- Downs, Elinor F.  
 1995 Freshwater Bivalves of the Concord Shell Heap. *Bulletin of the Massachusetts Archaeological Society* 56 (2):55-63.
- Dudek, Martin G.  
 2007 Archeological Intensive (Locational) Survey and Site Examination at the Dugans Brook Knoll Site (19-MD-151) for the Deaconess Water Treatment Facility Town of Concord, Middlesex County, Massachusetts. Report on file at the Massachusetts Historical Commission.
- Filios, Elena  
 1988 The End of the Beginning, or the Beginning of the End: The Third Millennium B.P. in Southern New England. *Man in the Northeast* 38:79-83.
- Hoffman, Curtiss and Adrienne Edwards  
 2002 The SuAsCo Watershed Archaeological Inventory Project: Exploring the Cultural Resources of a Suburban Area. Report on file at the Massachusetts Historical Commission, Boston, MA.
- Johnson, Eric S., and Thomas F. Mahlstedt  
 1982 The Ben Smith Archaeological Collection: A Preliminary Report and Assessment. Massachusetts Historical Commission, Boston, MA.  
 1984 *Guide to Prehistoric Site Files and Artifact Classification System*. Massachusetts Historical Commission, Boston, MA.
- Largy, Tonya Baroody  
 1995 Bone from Concord Shell Heap, Concord, Massachusetts. *Bulletin of the Massachusetts Archaeological Society* 56(2):64-70.
- Rhodin, Anders G. J.  
 1995 Archaeological Turtle Bone Remains from Concord Shell Heap. *Bulletin of the Massachusetts Archaeological Society* 56(2):71-82.
- Smith, Benjamin L.  
 nd Concord Report Volume I. Notes by Benjamin L. Smith on the archaeological sites that he investigated

in Concord over the course of his life. On file at the Concord Museum, Concord MA.

- 1940 A Report on a Fresh Water Shell Heap at Concord, Mass. *Bulletin of the Massachusetts Archaeological Society* 1(3): 14-26.

Waller, Joseph N. and Duncan Ritchie

- 1997 Intensive Archaeological Survey, Sleepy Hollow North Cemetery Expansion, Concord, Massachusetts. Report on file at the Massachusetts Historical Commission, Boston, MA.
- 2001 Archaeological Data Recovery Program, Pine Hawk Site (19-MD-793), Acton, Massachusetts. Report on file at the Massachusetts Historical Commission, Boston, MA.

## Mount Tom Cherts and Associated Lithics

### Connecticut Valley, Massachusetts

David Driver and Barbara Calogero

#### Abstract

In 1996, David Driver and Robert Leverett reported finding chert deposits in the Holyoke basalt pillows of Mount Tom. The cherts are fine-grained to microcrystalline rock in matte colors of light green, gray, tan, or red-brown, some of which have developed weathered rinds. Most show no bedding, but one chert sample has lavender bedding planes. Associated with the basalt and cherts are crusts of clear quartz crystals as well as amethyst quartz crystals colored by the manganese of the surrounding basalt. Two flakes and ten geological samples were analyzed petrographically in thin section.

To determine prehistoric use of the cherts, we reviewed 17 archaeological collections and assemblages. Samples from nine were prepared and analyzed in thin section to compare with the geological samples analyzed. In light of the results, it was evident that the Mount Tom chert was not used widely, and, therefore, our report was expanded to include not only local chert but also other rocks including hornfels that were

#### Introduction

In the 1850's, a hermit known as "Ole Billy Herrick" and his wife sold agate, gem quality crystals, and jasper to patrons crossing the Connecticut River by Hockanum Ferry in Hadley (Mount Holyoke Gazette 1887). Their mineral stand was set up between the ferry landing on the South Hadley side of the river and the halfway house for Mount Holyoke summit. The reference to jasper suggested that there might be a local source of this rock in the Pioneer Valley that could have been useful to prehistoric toolmakers. After reviewing numerous geological and archaeological reports of Pioneer Valley sites and its resources, Driver asked naturalist Rob Leverett, an expert toolknapper, to help him find sources of jasper. During their search in 1996 they identified a lithic scatter of weathered very fine-grained chert flakes at the north end of the Mount Tom range. A layer of a similar fine grained chert-like substance was located nearby in the west-facing basalt cliff. The basalt talus below the cliff face was intermixed with flakes of the gray to brown

cherty material. Driver referred to the location as "Rodimon's quarry" named after Walter Rodimon, a well-known collector in the Pioneer Valley in the 193-0's (Rodimon's Quarry, Massachusetts Historical Commission site no. 19-HD-308).

### 1996-1997 Lithic Analysis

Driver showed geoarchaeologist Dena Dincauze, University of Massachusetts Department of Anthropology, five flakes of the fine-grained material recovered from the Mount Tom lithic scatter as well as geological specimens of chert from the Pioneer Valley's Holyoke and Pocumtuck mountain ranges. Dincauze asked John Pretola, graduate student and director of the Springfield Science Museum, to prepare one flake in thin section for petrographic analysis. In a recent e-mail to Calogero, Pretola wrote as follows:

Your samples appear identical to the flake Dena gave me, and my recollection that the sample must have been weathered through is reinforced by the remaining butt (that I still have) which was faintly yellow-brown along the saw cut. I recall that the thin section remained opaque until I polished it off the slide and so the flake was just one big alteration layer.

(Pretola personal communication 2007)

Thin section preparation requires that a slice of rock glued to a glass slide is ground thin enough (30 microns) to permit light to pass through it. Most rocks can be identified microscopically in this way by the crystalline structure and inclusions in the groundmass, although some of the extremely fine-grained rock may require additional analytical techniques. Dincauze sent the light green fine-grained flake from a Mount Holyoke quarry for elemental analysis using its X-ray fluorescence. The results were as follows: 98% sili-

con dioxide, 1% titanium, and 1% gold (Dincauze personal communication 1996). Dincauze also sent two flakes to Calogero and geologist Anthony Philpotts, at the University of Connecticut, for further analysis (Dincauze 1996). Philpotts identified the flake thin sections as microcrystalline chert, one with clusters of clear needles (Calogero 1997). Driver provided another geological sample from Mount Tom that Philpotts (personal communication 1997) identified petrographically as a chert deposit in basalt.

### Mount Tom Field Trip

A geological field trip to the Mount Tom summit cherts was proposed in 1997, but busy schedules and life events intervened. A decade later the long delayed field trip to the Mount Tom cherts took place. Mount Tom State Reservation's senior Ranger Robert Carr and Driver guided a group of us including Dincauze and Philpotts to the northern summit where the lithic scatter was found in 1996. On the way we passed entablatures of columnar basalt prisms of the Holyoke basalt flow and from the summit we had a spectacular view of the Pioneer Valley and the picturesque oxbow meander of the Connecticut River.

At the summit, Driver showed us the location of the lithic scatter. As he recovered two more orange-brown flakes, we noticed a nearby rock (Figure 1) that was veined with the same orange-brown chert. We followed Driver south of the summit and over the edge of the steep west face of the cliff where we could examine the exposure of chert above and in the pillows of Holyoke basalt (Figure 2).

The basalt pillows formed as the Holyoke lava flowed into a lake millions of years ago, where it

cooled quickly forming pillows with still molten interiors that piled up and sagged down on one another. Trapped water derived from the lake and perhaps from the lava itself (Heinrich 2006) was heated to steam, expanding and exploding the cooling rock (Philpotts personal communication 2007). Heated water rich in silica, carbonates, and other minerals flowed into and around the brecciated or cracked pillows and over time deposited the fine-grained to microcrystalline cherts and crusts of tiny clear quartz and also amethyst crystals colored by manganese from the basalt (Philpotts 1990) (Figure 3). The chert layer above and deposits in and around the pillows were sampled and collected for further analysis. Philpotts noted the cavity in the rock face (Figure 4) that was left after a basalt pillow rolled downhill.

### Geological History of the Region

The geological history of these rocks began during the Mesozoic era, 245-65 million years ago. The region has a "...50 million year history of faulting, sedimentation, and lava eruption" (Skehan 2001: 225). As the supercontinent Pangea began breaking apart and the Atlantic Ocean opened, it caused rifting or tearing of the continental margin creating the Hartford and Deerfield basins. Subsequently, lava poured from feeder dikes (Figure 5 drawn after Philpotts and Martello 1986). The first flood basalt was the Talcott that flowed into a shallow lake that quickly cooled the lava's surface creating pillows that tumbled one on another as the flow pushed forward from the feeder dike. The Talcott flow did not extend into what is now Massachusetts, but as the rift continued to widen, a second massive outpouring of lava, the Holyoke, flowed across the sediments that had accumulated on the Talcott flow extending north into Massa-

chusetts. Where the lava flowed across dry land, its heat baked and metamorphosed the underlying margins of sediments and sedimentary rock into hornfels. Following thousands of years of sedimentary accumulation, a third outpouring of lava, the Hampden flow, again flooded the area with molten rock.

The ridges of resistant rock we see today are a result of block-faulting along the Connecticut Valley's eastern border fault, where a massive block of basalt and sediments slid down to the east upending and exposing beds of basalt and sedimentary rock as a steep mainly west-facing cliff. The cliff faces north where the blocks rotated as rifting continued (Skehan 2001). Subsequent glaciation and erosion scarred and scoured these ridges.

### 2007 Analysis of Mount Tom Samples

The ten geological samples collected on the field trip from the seams, pockets and beds of chert in the Holyoke basalt vary in color from tan, orange-red, to green-gray, some with lavender bedding. They also vary in degree of weathering. All are exceptionally fine-grained to microcrystalline and fracture conchoidally. The fresh rock is matte not lustrous, is slightly sticky, not slick when moistened, and emits no clay odor.

The two flakes from the summit as well as ten geological samples were prepared in thin section and analyzed microscopically. Philpotts identified the thin sections (see Appendix for descriptions) as microcrystalline chert deposited in basalt (Figure 6), and one sample has clusters of clear needles (Figure 7) like one flake analyzed in 1997 by Calogero and Philpotts. The others include brown glassy tachylite, a volcanic glass, grey bedded chert



with layers of lavender amethyst crystals (Figure 8), and a coarser chert with opaque minerals and carbonate crystals (Figure 9).

## Archaeological Evidence

Did prehistoric toolknappers use the Mount Tom chert deposits? Before examining museum and private collections and assemblages from the Pioneer Valley, we carried out a brief surface survey of several plowed fields in the Northampton Meadows just north of Mount Tom where Driver and others had reported lithic debitage. The historic and prehistoric artifacts identified at the Anciparch's Piggery site (site no.19-HS-351) included three waste flakes exposed on pedestals of dirt following recent rain. In thin section the flakes were identified as chert, one of non-local chert with long segmented fossils in the groundmass (Philpotts personal communication 2007). The other two flakes of cherts (Figure 10) were described as follows:

Both flakes are extremely fine-grained chert with lots of carbonates seen as patches of red amongst the dark clumps in the groundmass. The carbonates give the rock its buff color. These patches appear to be ankerite, an iron carbonate, that is weathering. The silica in the rock could have been transported by steam. These flakes match the thin section of the flake collected by Driver on our field trip in May, 2007.

(Philpotts personal communication 2007)

In the meadow south of the Piggery site, three of the flakes collected and analyzed in thin section provided information about the use of other local rock, a flake from a crystal of milky quartz, and two very dark flakes of slightly lustrous hornfels (Figure 11):

The original rock was a mud that shows a slump structure common in the Mesozoic shales and sandstones. The mud was then baked and metamorphosed by contact with the molten lava into a dark, exceptionally fine-grained rock. The rock has detrital grains of quartz and an abundance of magnetite.

(Philpotts personal communication 2007)

This was not the first mention of hornfels used in Northampton. Johnson and Bradley (1987) identified hornfels from the nearby Bark Wigwams site in the Northampton Meadows. Also, in 2000, Calogero analyzed a slightly lustrous dark waste flake from Northampton's Conner site for the University of Massachusetts Archaeological Services (Holmes, Donta, and Mulholland 1995). The thin section was described as follows:

The fine-grained groundmass has microscopic crystals and clumps or porphyroblasts, round clear patches, in a sea of opaque minerals. There is one small feldspar phenocryst on the edge of the thin section in darker material that may be the igneous rock in contact with the sediments that were metamorphosed into hornfels by the heat of molten lava flowing over the sediments.

(Calogero 2000)

Hornfels occurs in centimeters-wide contact margins where lava flowed across dry ground. In the 19<sup>th</sup> century, Amherst College geologist Edward Hitchcock described a contact-margin of what he called greenstone or trap [basalt] and the underlying sediments that had been altered by heat at the north end of Mount Tom and at Turner's Falls (1841). He noticed the change in the underlying sedimentary rock. Hitchcock's survey work was published prior to the advent of thin section analysis, first carried out by Henry Sorby in 1858 (Press and Siever

1982). Now we had two rock types, chert and hornfels, to track from Mount Tom.

We reviewed museum collections, private collections, and assemblages recovered during archaeological surveys and excavations (Figure 12). Some were sampled for thin section preparation and microscopic analysis. A likely place to begin our research was with the large Rodimon collection from the Pioneer Valley collected early in the 1930s. Calogero could not get timely access to the collection, and, therefore, consulted those who had examined the collection. Eric Johnson (1985) had noted the presence of chert in his report of the collection. He later recalled that one chert artifact had a “wood grain” appearance (Johnson personal communication 2007). John Pretola was also familiar with the Rodimon collection, having accessioned it as well as many other collections during his long tenure as curator of the Springfield Science Museum. Geological samples of the chert collected on the field trip as well as Philpotts’ descriptions of the thin sections sent to John Pretola elicited the following response:

Thanks for the samples. This is the gray material of my nightmares! From macroscopic inspection this stuff could be misidentified as argillite. It could also have been called fine-grained igneous material, and since it can have no obvious banding, it might have been called felsite, yes, and sometimes chert. I plead guilty.

My failing memory tells me that I have seen this material in the Science Museum collections, but I would have to say it plays a very minor role. I think I have seen some Brewerton Side-notched examples and also a few Susquehannabroad points. I am not certain but there also might be a Levanna Triangle or two.

(Pretola personal communication 2007)

On Pretola’s advice, Calogero reviewed a few collections from the Connecticut Valley in Massachusetts that are in the Connecticut state archives. Connecticut State archaeologist Nicholas Bellantoni provided access to the collections, and archaeologist, Marc Banks, provided access to his collection of tools from the border town of Suffield, Connecticut. No cherts similar to Mount Tom’s were identified macroscopically in these collections of formed tools.

In the Mount Tom State Reservation itself, only one formed tool, a small-stemmed projectile point of dark rock, has been recovered according to Ranger Carr (personal communication 2007). The point was found by the park’s historian, Richard Schwobe, who loaned it to the Holyoke Heritage Park Museum where it is on permanent display. In addition to the flakes recovered by Driver and Leverett, a small number of waste flakes were recovered at pre-Contact site during a cultural resource management survey of the Mount Tom State Reservation by the University of Massachusetts Archaeological Services (Binzen, Wendt, Barker, Mulholland, and Donta 2006). One flake examined macroscopically appears to be hornfels.

Additional collections from south and north of Mount Tom were examined under low power magnification. Some were sampled for thin section analysis. The Agawam, Holyoke, and Northampton surface and excavated collections examined are from the University of Massachusetts Archaeological Services archives. The excavated assemblage from the Pine Hill site, Deerfield, is from Department of Anthropology’s archives. The collections and assemblages were as follows:

Agawam: Boglish site, and Eastern Expressway;

Holyoke: Bear Bridge site, Mount Tom

(Binzen, et al 2006);

Northampton: Conner site (Holmes et. al. 1995), Shepherd's Farm, SU 2 site B, Mineral Hill, and King West site (Donta and Mulholland 1996);

Deerfield: Pine Hill site feature and four adjacent units (Chilton, Largy, and Curran 2000).

The analytical results (see Figure 17) indicate little evidence of local chert in these collections but more evidence of hornfels.

We then approached private collectors further north of Mount Tom. While searching for archaeological evidence of local chert use, we repeatedly found evidence of local hornfels, even in the collection from the Paleo-Indian Sugarloaf site in Whately. Gramly's (1998) list of lithics included 80% Hudson Valley chert and the rest as green Normanskill chert, buff rhyolite, quartz or quartzite, sandstone, greenstone, schist and graphite. After examining the tools, fluted projectile points, and several thousand waste flakes that remain in the landowner's possession, we selected seven flakes to prepare in thin section for analysis. Six are Hudson Valley radiolarian chert (Figure 12). None were local chert. One dark flake was identified as hornfels (Figure 13), very early evidence that toolknappers used local sources of the fine-grained rock. Hornfels was identified petrographically in thin section in two other collections. Two flakes from a large private collection from Sunderland's Long Plain Delta are exceptionally fine sediments that were baked and metamorphosed into hornfels (Figure 14). Five flakes of similar fine-grained hornfels were identified petrographically at the Nelson site further north in Northfield (Figure 15). Also the property owner asked us to identify a curious light green ball of chert or glass that he had found in his field along with the numerous other artifacts. A flake that had

separated from the ball was prepared in thin section. It was identified microscopically as either isotropic glass known as fulgurite, a fused sand formed by a lightning strike, or a manufactured glass (Philpotts personal communication 2007).

Also one light green flake provided to us from a private collection from Montague was identified as chert (Philpotts personal communication 2007). This is similar to what Hitchcock (1841) described as Prase, a green quartz. In a recent petrographic and chemical analysis of similar material, John Pretola described the thin section of a flake from the Quinnetuck Narrows site (19-FR-326) as "equigranular silica or chert with a slight green tint produced by green pleochroic epidote." (Pretola, in preparation:7). He noted the presence of quartz veins in the chert known as Pelham Prase that can also be seen in the Montague thin section (Figure 16).

## Discussion

We found little evidence of Mount Tom chert use prehistorically. Perhaps the Mount Tom chert was too intractable to be a useful resource or it was misidentified as hand specimens. Our research lends supports to these conclusions. During thin section preparation, Calogero found that the geological samples of Mount Tom chert were very hard to cut and grind. Leverett (personal communication 2007) also found the Mount Tom chert difficult to work and shape into a tool. In a knapping demonstration for us, he commented repeatedly how tough the chert was to shape and trim into a projectile point. Nevertheless, the tool had a sharp durable edge. Leverett's assessment of the Mount Tom chert may have been shared by prehistoric knappers who knew about the chert resource but relied upon

a wide array of other more tractable local and non-local rock: crystalline and milky quartz, sugary and coarse-grained quartzite, fine grained mylonite which is quartzite milled by fault movement, slate, shale, several sources of hornfels, graphite/chert, local Pelham Prase chert, and imported cherts from northern Vermont and New York as well as rhyolites from sources in eastern Massachusetts and New Hampshire.

The second issue in assessing artifacts is hand specimen misidentification of lithics, which has contributed to the problem of evaluating resource use (Luedtke 1980; Calogero 1992). Cherts are commonly recognized macroscopically by their color, luster, fossil voids, translucent edges, and slickness when moistened. The Mount Tom cherts are identifiable *in situ* geologically because they look so different from the adjacent basalt and underlying sandstone, but the cherts are difficult to recognize geologically because they look so different from the adjacent basalt and underlying sandstone, but the cherts are difficult to recognize archaeologically. They vary in color, are not lustrous or translucent but rather are opaque and not slick to the touch when moistened. The carbonates in the cherts weather with exposure to moisture and temperature fluctuations, and develop rinds that make them easily mistaken for other rocks. The flakes from the Anciparch's Piggery site looked like weathered basalt, but unlike basalt had no clay odor when moistened. Cherts flaked by Leverett of Mount Tom material, however, did have the typical glassy ring that we associate with siliceous cherts.

Hornfels, too, may be easily misidentified. The dark rock frequently has a tan, friable weathered rind similar to basalt, and may flake conchoidally much like Hudson Valley chert (Calogero and Philpotts 1995). However,

the edges of hornfels flakes and tools are opaque rather than translucent. While hornfels has been baked and recrystallized, it has the same constituents of the original sediment including feldspar, which weathers and erodes to clay minerals. Therefore, the rock is slightly sticky and has a clay odor when moistened. The baked rock at its source may be only centimeters thick and difficult to find. We have not identified its sources yet but the toolknappers did.

## Conclusion

We had assumed that Mount Tom's sizable deposits of fine-grained chert would have been attractive and useful for prehistoric toolknappers. However, the archaeological evidence in our small sample of 17 collections and assemblages does not support our assumption. The local Mount Tom chert was tested and used by toolknappers but not intensively, perhaps because more tractable rock such as hornfels was readily available to them. Now that the resource has been identified and reported, future archaeological research in the region around Mount Tom and additional petrographic analysis may reveal more use of the local chert and its associated rocks.

## Acknowledgements:

Anthony R. Philpotts, Rob Leverett, Dena Dincauze, Mount Tom State Reservation Ranger Robert Carr, Eric Johnson, John Pretola, Dave Graci, John Calogero, Doreen Philpotts, Alan and Bernice Sanderson and sons, Alan Jr. and Brad, Judy Hunter, Robert Laurenitis, George and Betty Nelson, Marc Banks, Nicholas Bellantoni, Mitchell Mulholland, Kerry Lynch, Christopher Donta, Elizabeth Chilton and her graduate students, and Heritage Park Ranger Dan Griffin.

## References Cited

- Binzen, Timothy, Jennifer Wendt, F. Timothy Barker, Mitchell T. Mulholland, and Christopher Donta  
 2006 Cultural Resources Inventory Report, Mt. Tom State Reservation, Easthampton and Holyoke, Massachusetts. University of Massachusetts Archaeological Services for the Massachusetts Department of Conservation and Recreation.
- Calogero, Barbara L. and Anthony R. Philpotts  
 1995 Rocks and Minerals Used by Tool Knappers in New England. *Northeast Anthropology* 50:1-17.
- Calogero, Barbara  
 1992 Lithic Misidentification. *Man in the Northeast* No. 43: 87-90.  
 1997 Report of petrographic analysis to Dena Dincauze.  
 2000 Contract report of petrographic analysis for the Archaeological Services, University of Massachusetts, Amherst, MA.
- Chilton, Elizabeth, Tonya Largy, and Marylou Curran  
 2000 Evidence for Prehistoric Maize Horticulture at the Pine Hill Site, Deerfield, MA. *Northeast Anthropology* 59:23-46.
- Dincauze, Dena  
 1996 Letter: request for petrographic analysis of one quarry flake and one from Goat's Peak lithic scatter, Mount Tom, provided by D. Driver.
- Donta, Christopher L. and Mitchell T. Mulholland  
 1996 Route 66 Reconstruction and Realignment: Extended Archaeological Site Examination (Phase II) of the Conner Prehistoric Site, Northampton, Massachusetts. University of Massachusetts Archaeological Services, Amherst, MA.
- Driver, David  
 1998 Rodimon's Quarry report, Mount Tom, Easthampton, Massachusetts. Report submitted to the Massachusetts Historical Commission.  
 2007a Report of the Rocheen Dalby Cherts in the Pioneer Valley. Report submitted to the Massachusetts Historical Commission.  
 2007b Anciparch's Piggery report. Report submitted to the Massachusetts Historical Commission.
- Gazette Printing Company  
 1887 *Mount Holyoke and Vicinity*. Northampton, MA.
- Gramly, Richard Michael  
 1998 *The Sugarloaf Site: Palaeo-Americans on the Connecticut River*. Persimmon Press Monographs in Archaeology: Buffalo, NY.
- Heinrich, Christoph A.  
 2006 How Fast Does Gold Trickle Out of Volcanoes? *Science* 314: 263-264.
- Hitchcock, Edward, LL.D.  
 1841 *Final Report of the Geology of Massachusetts*. vol. 1. J. H. Butler: Northampton, MA.
- Holmes, Richard D., Christopher L. Donta, and Mitchell T. Mulholland  
 1995 Archaeological Site Location Survey and Site Examination of Three Sites, Route 66 Highway Improvement Project, Northampton, MA. University of Massachusetts Archaeological Services, Amherst, MA.
- Johnson, Eric S.  
 1985 Prehistoric Collections in Massachusetts, The Walter S. Rodimon Collection, Connecticut River Valley. Massachusetts Historical Commission: Boston.  
 2007 E-mail regarding the Rodimon collection, Springfield Museum.
- Johnson, Eric S. and James W. Bradley  
 1987 The Bark Wigwams Site: An Early Seventeenth Century Component in Central Massachusetts. *Man in the Northeast* 33:1-26.



Luedtke, Barbara

1980 Neutron Activation Analysis of New England Volcanics. Paper presented to the Annual Conference of the Society of American Archaeology, Philadelphia, PA.

Philpotts, Anthony R.

1990 *Principles of Igneous and Metamorphic Petrology*. Prentice Hall: Englewood Cliffs, NJ.

Philpotts, Anthony R. and Angela Martello

1985 Diabase Feeder Dikes for the Mesozoic Basalts in Southern New England. *American Journal of Science* vol. 286:105-126.

Press, Frank and Raymond Siever

1982 *Earth*. Third edition. W. H. Freeman and Company: San Francisco.

Pretola, John P.

2007 E-mail regarding the Rodimon collection and lithic identities of assemblage artifacts in the Springfield Museum, Springfield, MA

in press Pelham Prase – a local Connecticut Valley lithic resource. Paper presented in 2007 at the 74th Annual Meeting of the Eastern States Archaeological Federation, Burlington, VT.

Skehan, James W.

2001 *Roadside Geology of Massachusetts*. Mountain Press Publishing Co.: Missoula, MN.



**Figure 1. Basalt breccia veined with orange-brown very fine-grained chert, Goat's Peak, Mount Tom. (photograph: J. Calogero)**



**Figure 2. Basalt pillow in Holyoke flow, Mount Tom west face. (photograph: J. Calogero)**



Figure 3. Chert deposit above basalt pillow, Mount Tom west face. (photograph: J. Calogero)



Figure 4. Cavity in Holyoke flow left by a basalt pillow that has rolled downhill, Mount Tom west face (photograph: J. Calogero)

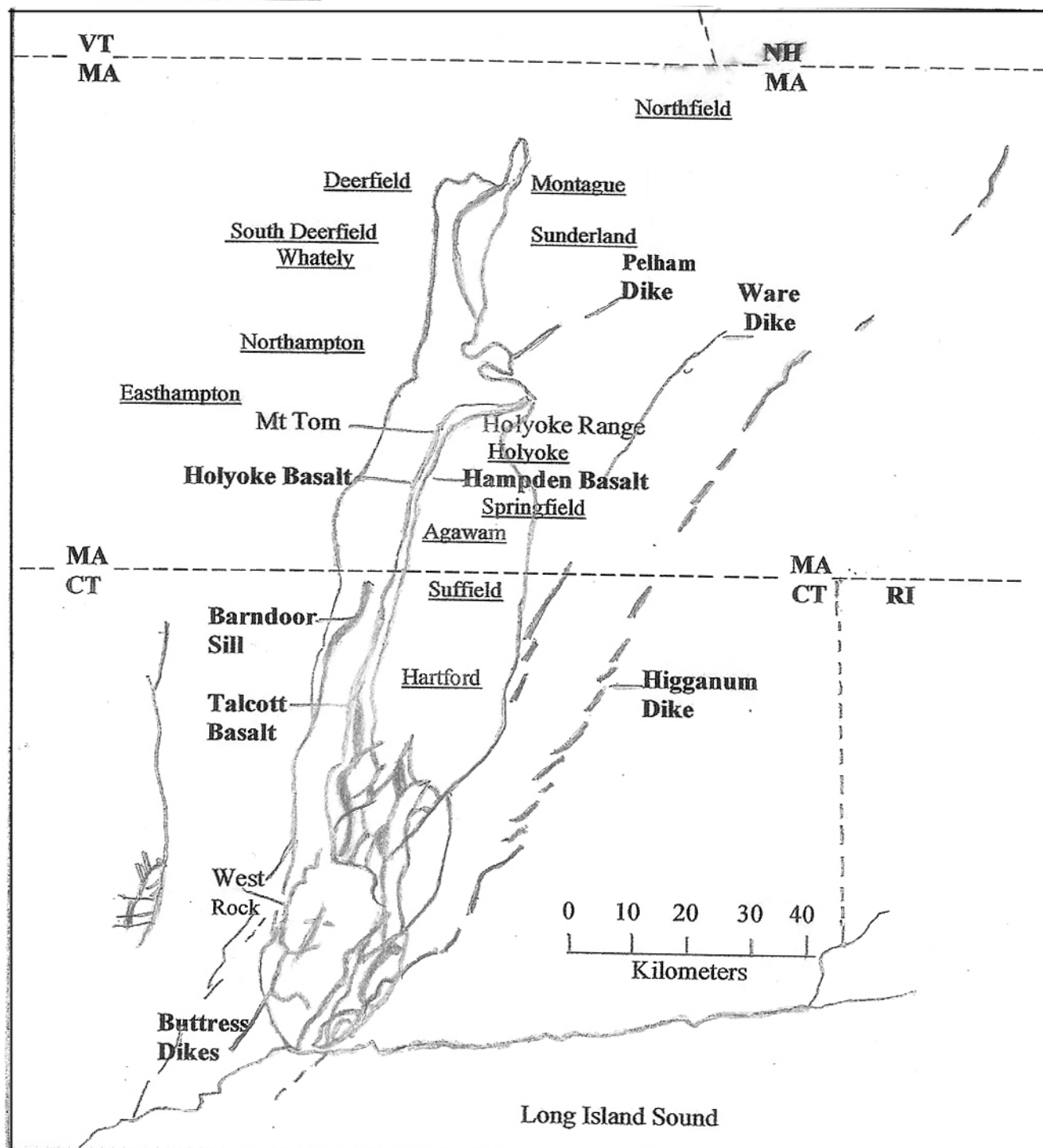
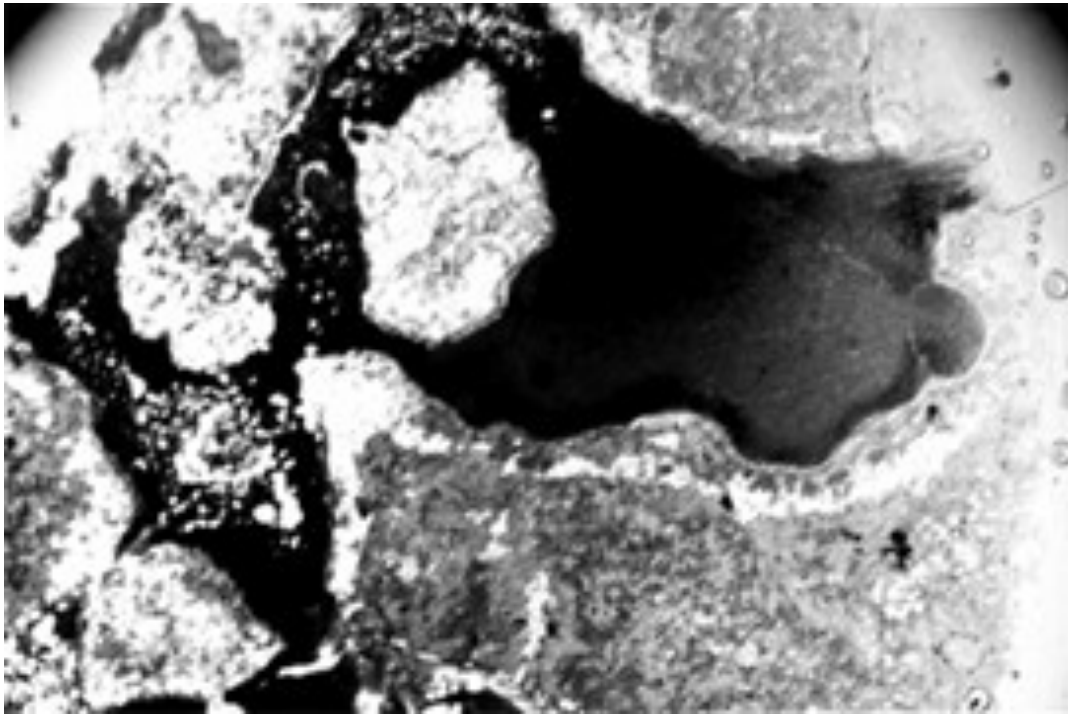
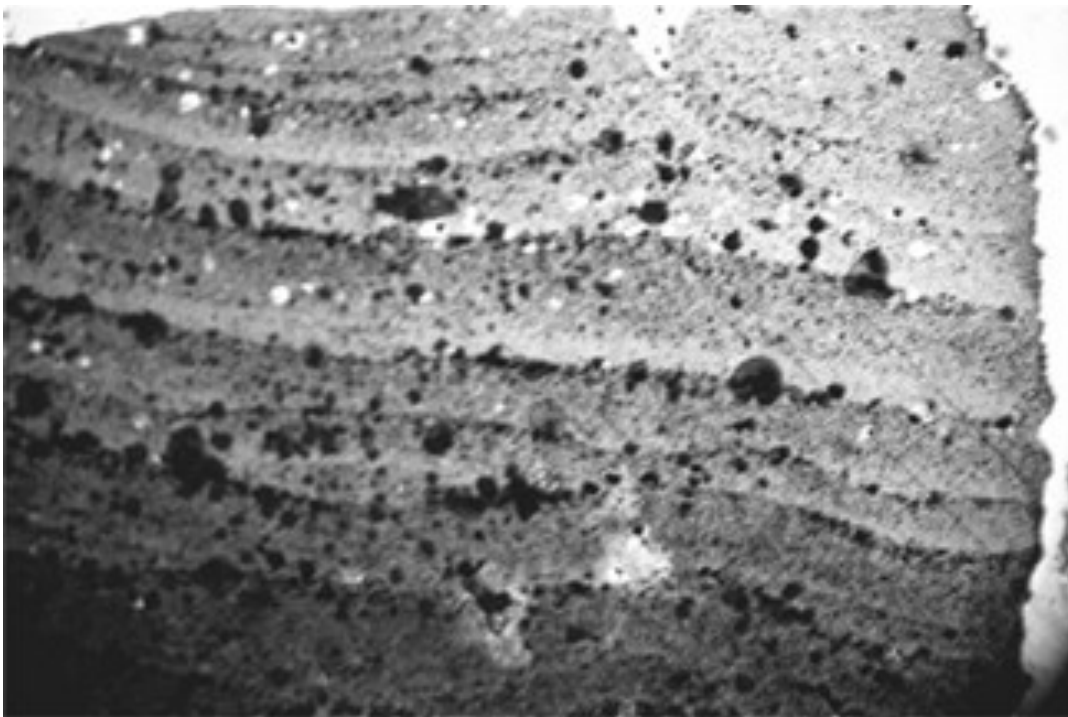


Figure 5. Map of Southern New England showing locations of Mesozoic basalt flows and diabase intrusions in the Hartford-Deerfield Basin (drawn after Philpotts and Martello 1985) and also the locations of Mount Tom and towns mentioned in the text.

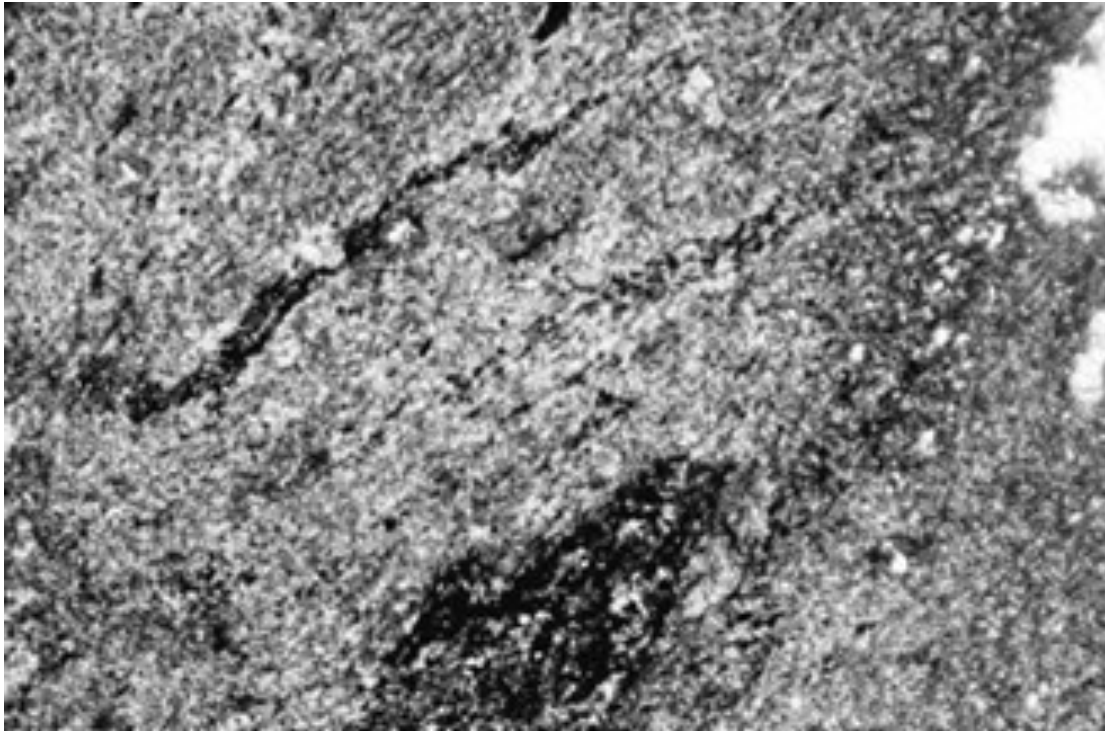


**Figure 6. Chert / basalt thin section in geological sample, Mount Tom west face: mag. x15, field of view 3 mm (photomicrograph: B. Calogero).**

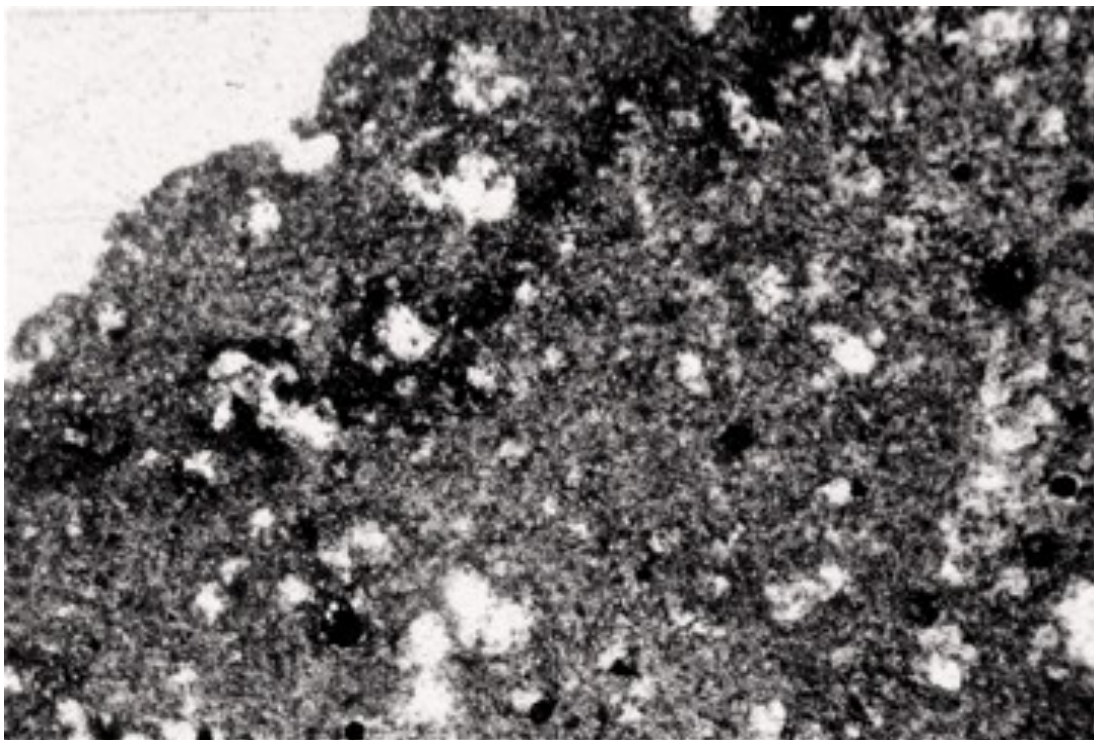


**Figure 7. Chert thin section with clusters of needles in geological sample, Mount Tom west face: mag. x25, field of view 1 mm (photomicrograph: B. Calogero).**



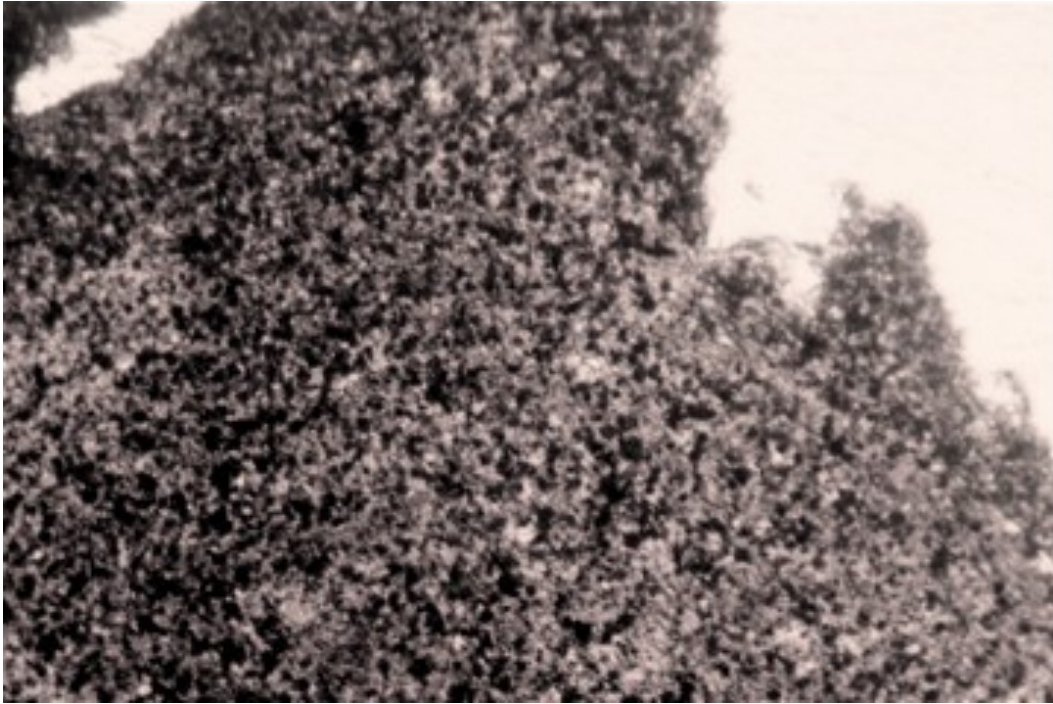


**Figure 8. Bedded chert thin section with amethyst crystals in geological sample, Mount Tom: mag. x15, field of view 3 mm (photomicrograph: B. Calogero).**

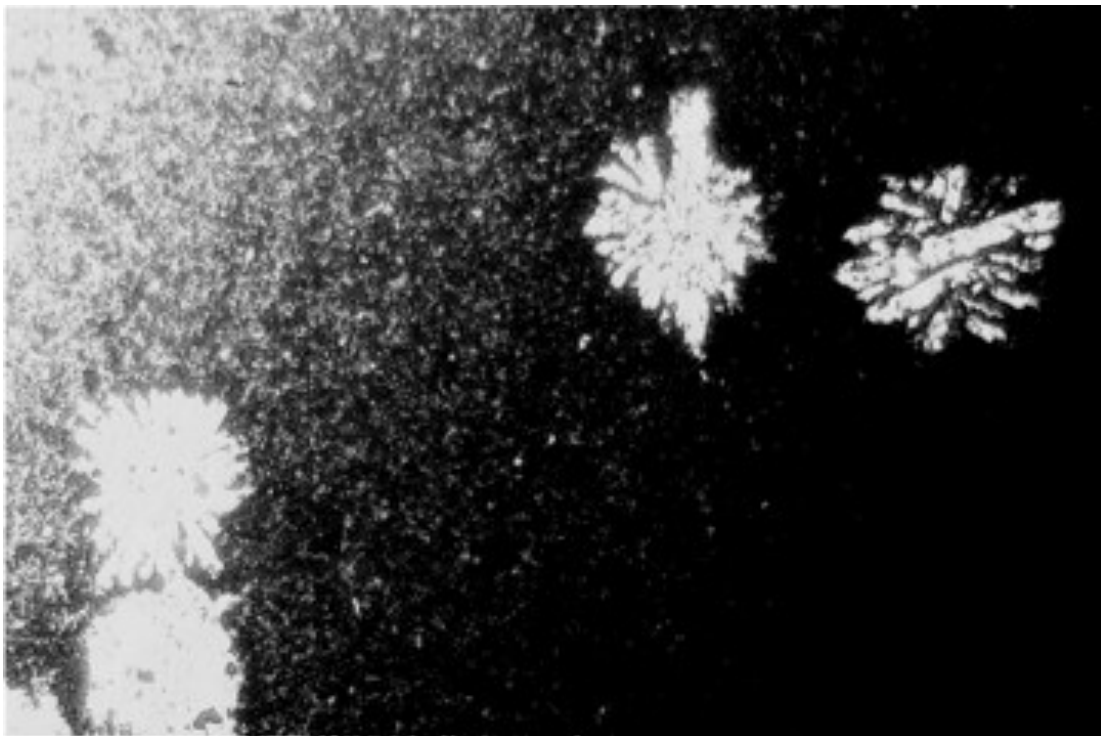


**Figure 9. Chert thin section with opaques and carbonate crystals in geological sample, Mount Tom: mag. x25, field of view 1 mm (photomicrograph: B. Calogero).**

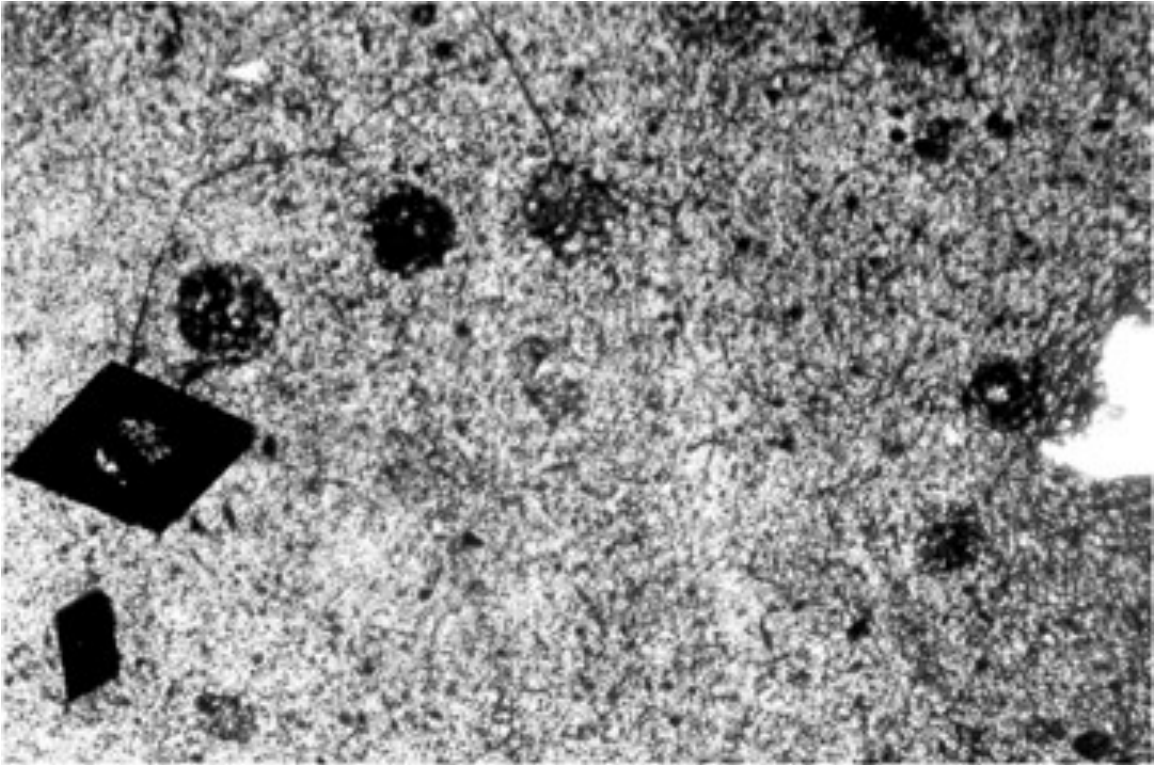




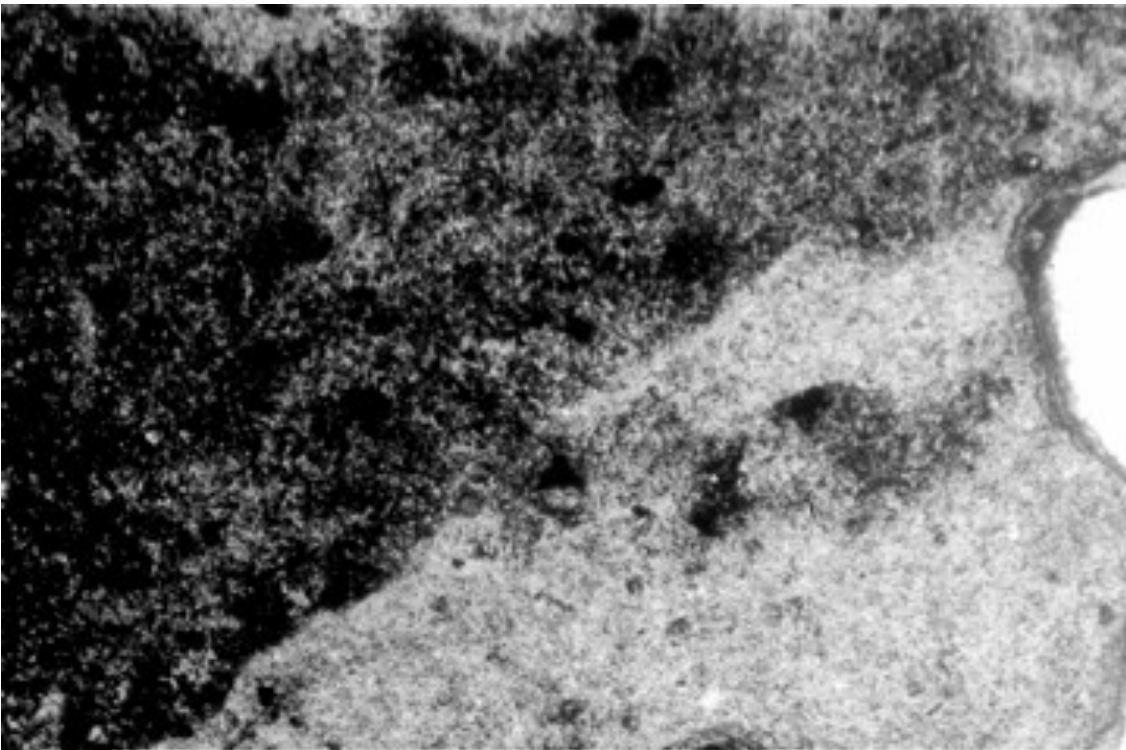
**Figure 10. Anciparch's Piggery site chert artifact thin section is Mount Tom chert with opaque minerals and eroded carbonate crystals, Northampton Meadows, MA: mag. x25, field of view 1 mm (photomicrograph: B. Calogero).**



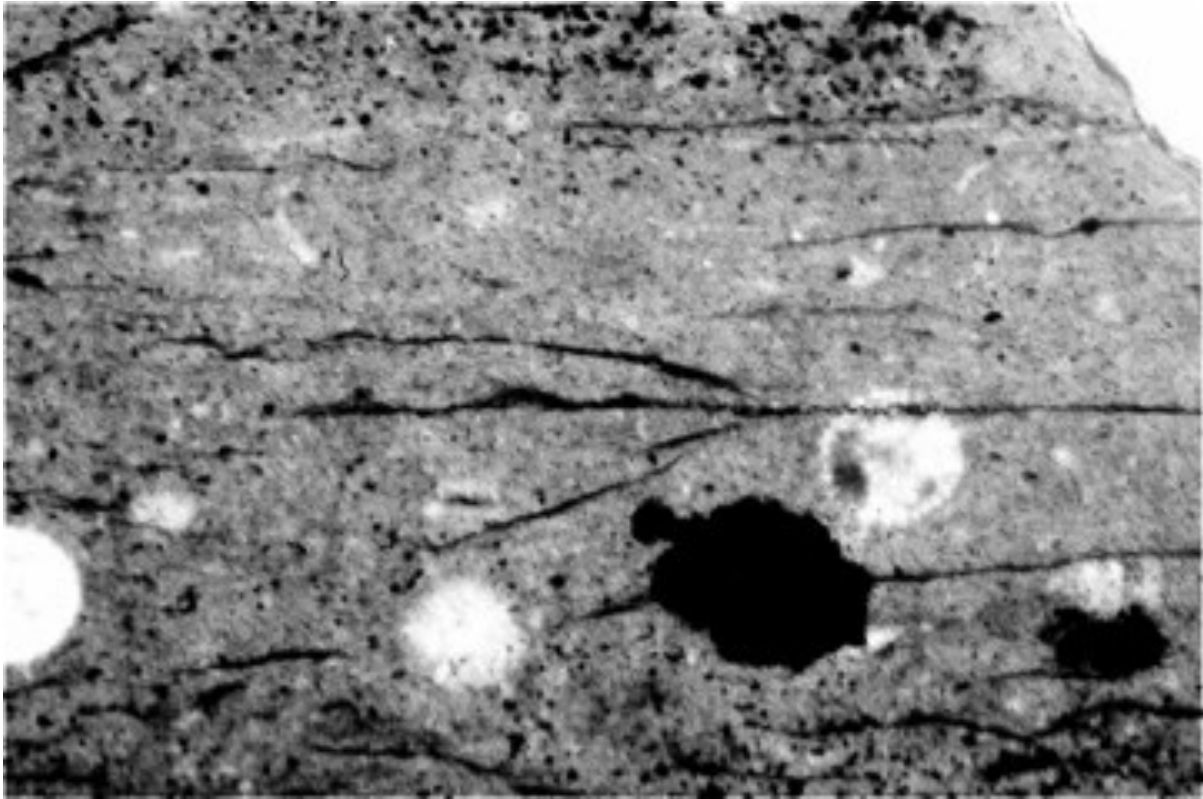
**Figure 11. Artifact thin section of hornfels with remnant bedding, Northampton Meadows, MA: mag. x25, field of view 1 mm (photomicrograph: B. Calogero).**



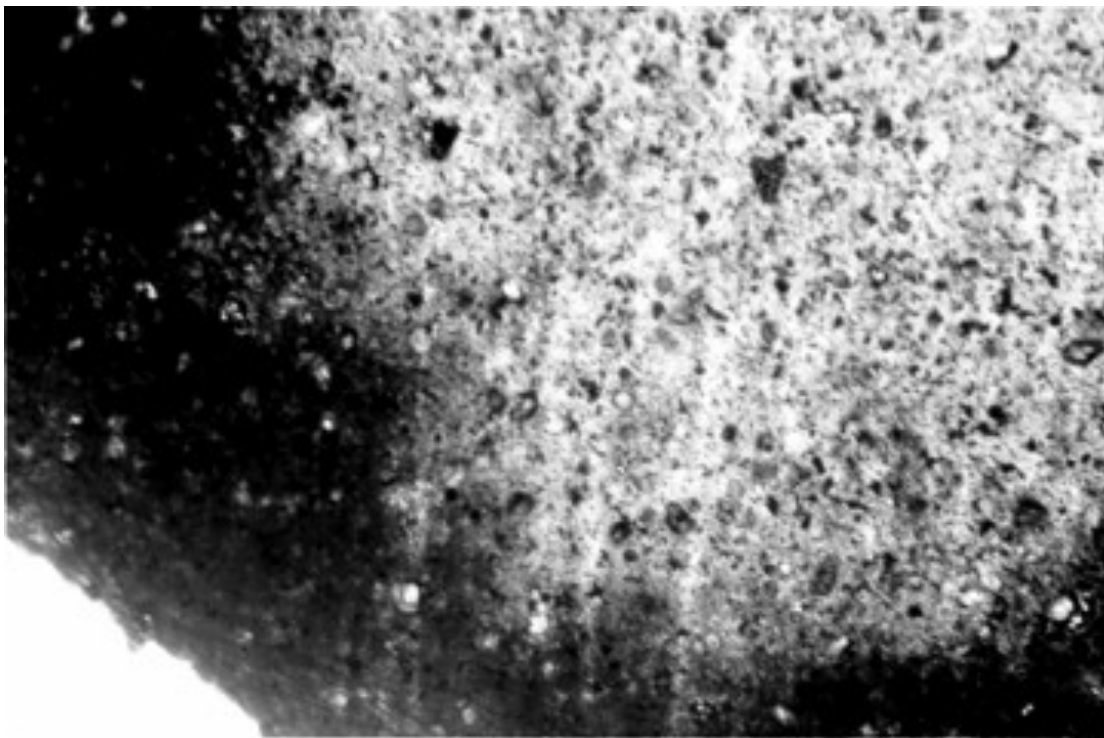
**Figure12. Artifact thin section of non-local radiolarian chert, Sugarloaf site, Whately, MA: mag. x25, field of view 1 mm (photomicrograph: B. Calogero)**



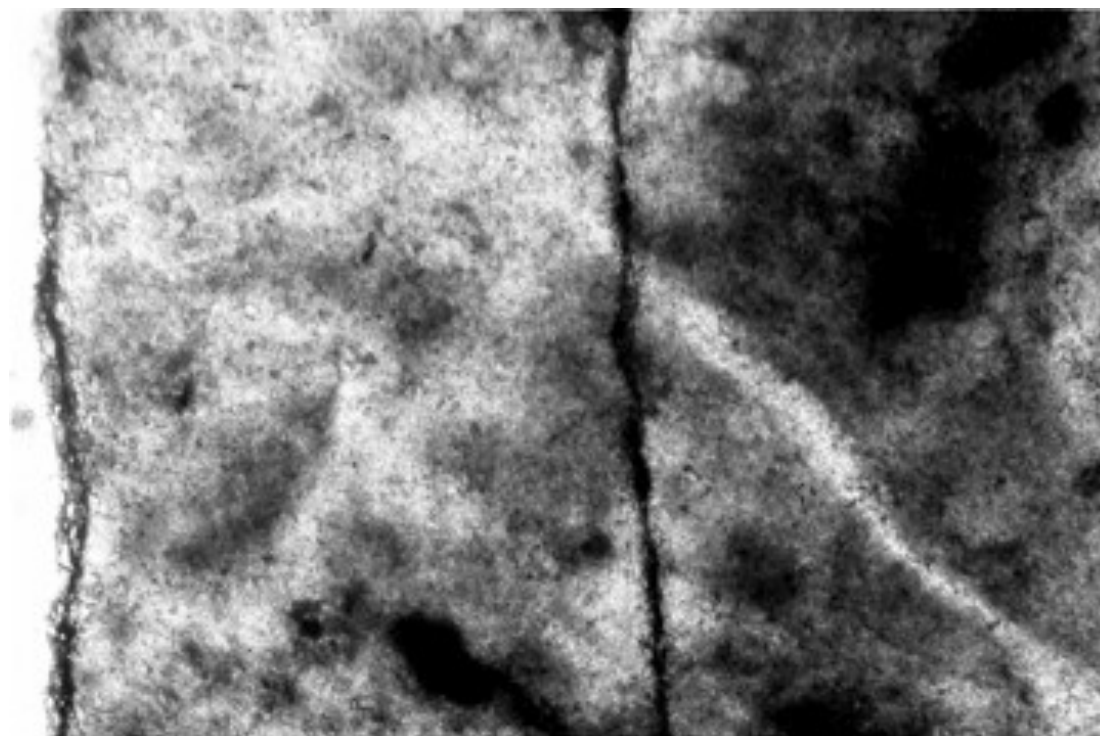
**Figure13. Artifact thin section of hornfels, Sugarloaf site, Whately, MA mag. x25, field of view 1 mm (photomicrograph: B. Calogero).**



**Figure14.** Artifact thin section of weathered hornfels, Long Plain Delta site, Sunderland, MA  
mag. x25, field of view 1 mm (photomicrograph: B. Calogero).



**Figure15.** Artifact thin section of hornfels, Nelson collection, Northfield, MA  
mag. x25, field of view 1 mm (photomicrograph: B. Calogero).



**Figure 16. Artifact thin section of local chert from collection, Montague, MA. mag. x25, field of view 1 mm (photomicrograph: B. Calogero).**

**Figure 17. Appendix: All microscopic identifications and descriptions were provided by geologist and geophysicist, Anthony R. Philpotts, University of Connecticut (ret.).**

**I. 1997 Holyoke Range, Amherst, MA from D. Driver for analysis**

#1 The specimen is a grey fine-grained material.

**chert**

Micro: There are carbonate crystals and a few mica flakes in the unusually fine-grained groundmass of what is probably a chert.

#2

**chert**

Micro: The specimen has spheres in a microcrystalline ground with tiny needles of feldspar and quartz. There are no carbonates but lots of little micas with split ends in this fine-grained chert.

**II. 2007 Mount Tom Field Trip: flakes collected on the summit by D. Driver**

#1A The flake rind is brownish gray (5YR 4/1). Fresh cut is light olive gray (5Y 6/1).

**chert**

Micro: The fine-grained chert has small orange-red crystals that might have been carbonates that are now rusty.

#1B The flake rind is dark yellow brown (10YR 4/2). Fresh cut is pale yellow brown (10YR 6/2).

**chert**

Micro: There are very fine birefringent specks throughout the fine-grained rock.

**III. 2007 Mount Tom field trip: geological samples**

Bottom of Holyoke flow/top of arkose identified by A.R. Philpotts in the field.

- #2 (geol. spec.) Rind is brownish gray, yellow brown, and pale brown. **Holyoke basalt**  
There is some chert infilling in the basalt and irregular rusty holes and patches in the interior fresh rock.

Micro: The basalt is packed with feldspar laths and crystals.

- #3 (geol. spec.) There are clusters of crystals in a vacuole. **basalt and chert**

Micro: This is a badly altered basalt with gas amygdulites (gas cavities), and veins cutting through highly birefringent needles, streaks or plates. There are rusty patches and needles parallel to the vein.

- #4 (geol. spec.) The specimen was a very, very tough rock to cut and grind and produced sparks when sawn. The chert is not slick but slightly sticky when moistened. **chert**

Micro: The cryptocrystalline ground has multiple clusters of colorless crystalline rods in the cherty material. There are lots of needles of unknown identity as in the old thin section of flake artifact made in 1997. Compare with similar slide made in 1997. The extremely fine-grained groundmass has lots of carbonates and silica crystals that could be anhydrite. Some of the crystals are in rhombic or rectangular shapes. Anhydrite dissolves leaving cavities that are now filled with quartz which would explain why carbonates are all around them. This may be an evaporite known as globberite.

- #5 (geol. spec.) The rough dark rind is brown black. **basalt**

Micro: The thin section shows a basalt/chert interface. A fragment on the edge of the Holyoke pillow is the coarse-grained basalt chill-margin against tachylite, a brown volcanic glass. In this brown devitrified glass there are bits of very fine-grained needles of plagioclase crystals floating in the glass that flowed against the basalt pillows.

Interstices around and above pillows of Holyoke basalt

- #8A (geol. spec.) The rough weathered rind is a pale yellowish brown. **chert**  
The marked layering was evident in the hand specimen.

Micro: The thin section shows a gorgeous example of graded bedding known as a *geopetal* structure in gas cavities of rhythmic sedimentation.

- #8B (geol. spec.) Rough rind is olive gray. **chert**

Micro: The cherty material has parallel needles and some bedding and patchy areas with extremely fine-grained chert in coarser cherty material.

*This was from a crusty rock with chert veining in basalt and gas vacuoles some of which were filled with brownish chert.*

*Collected by A.R. Philpotts*

- #9 (geol. spec.) The rough rind is dark grey (N3). **basalt, chert, and quartz**  
The specimen was removed from the edge of the crusty rock.

Micro: The thin section shows a rapidly quenched basalt of a pillow with zonation of quartz/chert slightly banded in an amygdule bubble vesicle in bubbly basalt.

*Specimen from large sample removed from the west wall*

- #10A (geol. spec.) Rough rind is moderate yellowish brown. **chert**

Micro: The thin section has the same needles as in #8B.

*Samples from large specimen removed from the west wall*



#11A (geol. spec.) The weathered specimen with conchoidal fractures was very, very tough. **chert**  
 Micro: The fine-grained chert is spotted with carbonates with high birefringence.

#11B (geol. spec.) The weathered rind is light brown. The differential hardness of the **basalt and chert**  
 basalt and chert made it difficult to grind to proper thinness.  
 Micro: All through the specimens are aligned parallel needles in a flow of cherty material. The chert with carbonates has come from boiling water that circulated into the basalt that was brecciated by steam explosions. There are similar pillows at the bottom of the Holyoke flow in Deerfield.

#### IV. Artifacts from assemblages and collections

*Anciparch's Piggery site, Northampton Meadows surface survey, June, 2007.*

#1 The weathered flake has a rough light olive gray rind and sharp flake scars. **chert**  
 Micro: In thin section this rock is the same as the Mount Tom geological specimens. It is extremely fine-grained with lots of carbonate crystals which appear to be ankerite, an iron carbonate that is weathering.

#2 The weathered flake with sharp flake scars is light olive (5Y 4/1). **chert**  
 Micro: The grain size of this rock is the same as the previous flake and has a similar appearance with dark balls of material as #1A, from the 2007 field trip, recovered by Driver under the moss where he had first found a lithic scatter on Mount Tom. In amongst the dark clumps are patches of red which give the rock its buff color. These could be clumps of weathering ankerite, an iron carbonate. The silica could have been transported by steam.

#3 The smooth lustrous flake is olive gray (5Y 4/1). **non-local chert**  
 Micro: The thin section of this chert with carbonate rhombs is coarser-grained than the previous specimens and very different in appearance. It has many long segmented needles that are fossils.

*Bark Wigwams site, Northampton Meadows surface survey, June, 2007*

#4 The slightly lustrous flake is medium dark gray (N4). **hornfels**  
 Micro: This very fine-grained rock has detrital grains of quartz and an abundance of magnetite. The ground mass is dark gray with layers of black streaks and what appears to be a fold or slump structure of mud common in the Mesozoic shales and sandstones. The mud was baked by contact-metamorphism into hornfels.

#5 The sample is similar to the previous flake. **hornfels**  
 Micro: It is extremely fine-grained with big patches of magnetite and a hint of heat-elongated needles that are birefringent.

*Conners site, Northampton survey (analysis for Mulholland and Archaeological Services, U.Mass, Amherst)*

#1 A slightly lustrous dark flake. **hornfels**  
 Micro: The fine-grained groundmass has microscopic crystals and clumps of porphyroblasts (round clear patches) in a sea of opaque minerals. There is one small feldspar phenocryst on the edge of the thin section in darker material that may be the igneous rock in contact with the hornfels sediments metamorphosed by the molten lava.

*Sugarloaf site, Whately, MA*

#1 SGL-833 The artifact flake is dark greenish gray. **non-local chert**  
 Micro: The fossiliferous chert has long needles of material and spheres now filled with chalcedony that were probably radiolaria.

- #2 SGL-748 The artifact flake rind is dark yellow brown (10YR 4/2). **non-local chert**  
 Micro: The groundmass has beautiful rusty rhombs that were probably carbonates that are now altered to limonite. This, too, is a radiolarian chert.
- #3 SGL-837 The artifact flake rind is light olive gray (5Y 5/2). **non-local chert**  
 Micro: The groundmass has rusty rhombs that were carbonates now altered to limonite. It also has rusty spheres filled with chalcedony that were fossil radiolaria.
- #3B SGL-378 The artifact flake rind is pale yellow brown (10YR 6/2). **non-local bedded chert**  
 Micro: There is a hint of bedding in the groundmass that has rusty rhombs, clouds of material, and fossils.
- #4 SGL-397 The artifact flake rind is dark yellowish brown (10YR 4/2). **non-local chert**  
 Micro: This is also a non-local chert that is probably from the Hudson Valley.
- #5 SGL-596 The artifact flake rind is brownish gray. **non-local chert**  
 Micro: The crystalline groundmass has opaque minerals and radiolaria.
- #6 SGL-643 The artifact flake rind is dark yellow brown (10YR 4/2). **local hornfels**  
 Micro: The microcrystalline groundmass has a few rusty dissolving rhombs and also a dark bed or intrusion of soupy material. There are many rhombs and very fine-grained needles. The slight bedding plane has a hint of something spherical.

*Long Plain Delta collection, Sunderland, MA.*

- #1 The primary rind is yellowish gray (5Y 7/2). **local hornfels**  
 Micro: This was a fine-grained sediment like the hornfels from the Northfield collection. There are rather large porphyroblastic crystals growing along a line in the groundmass. These are extremely birefringent. Also growing in the rock are crystals with high birefringence that could be grossular garnets. This would be normal with contact-metamorphism but requires calcium to form the calcium iron garnets. Another possibility is that the crystals are corundum which would require alumina. There is a reaction rim around one of the crystals the core of which has a higher Refractive Index than the surrounding melt.
- #2 The mid-shaft of a broken projectile point has an olive gray rind (5Y 4/1). **local hornfels**  
 Micro: This contact-metamorphosed hornfels also has lots of needles as the previous thin section and also in Nelson/Northfield #5 and #6. The needles have the refractive index of quartz. The intermediate vibration of light through each crystal is parallel to the length of the crystal and the fast and slow vibrations are at right angles. The same needles right next to each other show the blue or yellow color depending on how the crystal is rotated.

*Montague collection*

- #1 The light green crystal or artifact flake rind is light olive gray (5Y 5/2). **local chert**  
 Micro: This is a mottled fine crystalline chert that could be of local origin.

*Nelson collection, Northfield, MA.*

- #1 The green translucent rock shaped into a ball may be an artifact. **fulgurite?**  
 The specimen is a round ball that shows some evidence of shaping leaving conchoidal fractures. It may have become rounded by tumbling in a stream or in a glacial deposit.  
 Micro: The flake that fell off the ball was prepared in thin section. "It is isotropic with no inclusions. It is a glass

formed at high temperature because the iron is reduced giving it the greenish color. This is either a manufactured glass or the result of a lightening strike that fused the sand into glass."

- #2 The artifact flake rind is medium dark gray (N4) and the fresh cut is medium gray (N5). **local hornfels**  
The rock was very hard and resistant to grinding.

## A Stranger in My Field

Donald Gammons

For many years I have mowed a 2-acre field on my property. This field borders the south shore of Elders Pond in Lakeville, Massachusetts. The pond is a water reservoir for the City of Taunton and is located between Precinct Street on its north side and by Pickens Street on the south. The surrounding area was farmed from the mid-18<sup>th</sup> century to the late 20<sup>th</sup> century and was used by Native Americans for centuries before that.

I had noticed a palm-sized surface of stone in the field which is unlike any that are common to this area. It is black and has a shiny surface like basalt. Curiosity finally got me out with a trowel to see more of this rock. After a short period of scraping around, I had to use a shovel to get this piece out of the ground. It weighs about 40 lbs (18 kg) and is the size of a large cantaloupe. The black shiny material shows signs of having been worked to produce spalls or flakes that could further be worked to make tools, such as scrapers and points.

Wanting some answers about the composition of the black stone and how it came to Lakeville, I brought it to the Robbins Museum for Curtiss

Hoffman to evaluate. He made an initial visual identification of the stone as silicified coalstone, a replacement mineral which was sometimes used by local Native Americans to make tools, because of its conchoidal fracture. Jeff Boudreau confirmed this identification and took a photo of the stone (see Figure 1), and also knapped off a few spalls which were sent to Dr. Barbara Calogero for thin-sectioning and analysis.

Dr. Calogero's first impression on visual inspection was as follows:

The thin section sample taken from the large cobble looks like coal, as you thought. A cellular structure now mineralized is evident across the section. It may be wood or plant remains. . . . The large sample shows conchoidal fractures typical of hard coal. I don't see any evidence of it having been worked. I am going to see if I can burn one of the flakes I removed. Such hard coal is hard to ignite but maybe a small blowtorch will do it. The *Roadside Geology of Massachusetts* by Skehan (2005) has maps and information about coal in Massachusetts. (personal communication 2/14/2009)

After subsequent analysis she concluded:

Macro: The black and grey sample has conchoidal fractures in the black core of the sample. A small slice of rock was cut from the larger end of the sample and prepared in thin section. It was hard and resistant to grinding and produced a black slurry.

Micro: The thin section, analyzed microscopically, has a dark ground with a regular pattern or lattice of voids now filled in with silica. This pattern is characteristic of silicified wood.

Identification: The sample is coal. (personal communication 3/7/2009)

### Reference Cited

Skehan, James

2005 *The Roadside Geology of Massachusetts*. 3<sup>rd</sup> edition. Mountain Press, Missoula Montana.



Figure 1. Coalstone Cobble from Lakeville MA (photograph by Jeffrey Boudreau)

## CONTRIBUTORS

BARBARA CALOGERO Ph.D., a graduate of the University of Connecticut, is a contract archaeologist. Her research focus is thin section analysis and identification of stone tool lithics as well as geological sources in the Northeast.

DAVID "BUD" DRIVER is an operating engineer employed at the Northampton Veterans Administration Medical Center, Leeds, MA, in the transportation division. He is currently a Historical Commissioner for the town of Deerfield and a community stake holder in the Area "D" Archaeological Site Project of Deerfield. As a member of the Massachusetts Archaeological Society, he has a special interest in lithics used prehistorically and their sources.

MARTIN DUDEK is Principal Archeologist/Project Manager for John Milner Associates, Inc. Martin received a Bachelor's degree in Anthropology from University of Maryland in 1985 and a Master's degree in Anthropology from Brandeis University in 1992. Martin has over 25 years experience in the archeology of North America, with field experience at ancient cities in Mexico, a multi-component site spanning from Paleoindian to the late pre-Contact period in California, ethno-archeological work in Honduras, and coastal surveys in Alaska. Over the last seventeen years Martin has been involved in numerous archeological projects in Massachusetts and New Hampshire. He served as data manager and laboratory supervisor for several archeological data recoveries conducted for the Central Artery/Tunnel. He has authored or co-authored over fifty Cultural Resource Management reports for New England and directed excavations at Native American sites in New England spanning every temporal period from Paleoindian through the seventeenth century and at historic American sites spanning the seventeenth century through the early twentieth century.

KATHRYN FAIRBANKS is a long-time member of the M.A.S., and has served as its Librarian since her retirement from teaching.

DONALD GAMMONS is a long-time member of the M.A.S. and continues to do maintenance at the Robbins Museum. His first experience in archaeology was at the Wapanucket Site, digging with Doc Robbins and the Cohannet Chapter for 15 years.

WILLIAM B. TAYLOR is a long-time member of the M.A.S. and is a member of its Board of Trustees. He has been an ardent collector of Indian artifacts in the Titicut area for more than sixty years.

## NOTES TO CONTRIBUTORS

*The Editor solicits for publication original contributions related to the archaeology of Massachusetts. Authors of articles submitted to the Bulletin of the Massachusetts Archaeological Society are requested to follow the style guide for American Antiquity (48:429-442 [1983]). Manuscripts should be sent to the Editor for evaluation and comment at [c1hoffman@bridgew.edu](mailto:c1hoffman@bridgew.edu).*

*For shorter manuscripts (5 pages or less), texts may be submitted as paper copies. Longer manuscripts should be submitted as electronic files (preferably MicroSoft Word .doc or .docx files, or .rtf files). All text should have margins of 3 centimeters (1¼ inch) on all edges. For electronic files, do not insert artificial spaces between lines; instead, use the Format/Paragraph/Line Spacing function and select "Double". Proper heading and bibliographic material must be included.*

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*All illustrations and tables, called figures, should be submitted as electronic originals. Tables should be submitted as separate Excel (.xls or .xlsx) spreadsheets and not incorporated into the text. Figures should be submitted as either .tif or .jpg files, high contrast, in greyscale. Each figure should fit within the space available on a Bulletin page, which is 17 cm by 23 cm (6½ x 9 inches), allowing for margins. Full, half or quarter page figures should be planned carefully. Space must be allowed for captions. Captions should accompany the text in a separate section, in order and numbered to correspond to the figures.*

*Figures must be referred to in the text and are to be numbered in their order of reference, with their number indicated in the file name. Every item in each figure and each person should be identified. All lettering must be clear and legible. Scales with dimensions, preferably in metric measurements, should be included with all figures for which they are appropriate.*

*Dimensions and distances should be given in metric units or in metric units and English units, to the same standard of accuracy (e.g., 10 cm or 2.5 inches, not 2.54 inches).*

*Authors should include a brief (1 paragraph) biography for the "Contributors" page of the Bulletin issue.*





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